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CHICAGO DENTAL SOCIETY: 72<sup>nd</sup> ANNUAL MIDWINTER MEETING: FEBRUARY 17<sup>th</sup>-20: STEVENS HOTEL: CHICAGO

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**JANUARY, 1936**

Volume 42

No. 1

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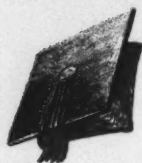
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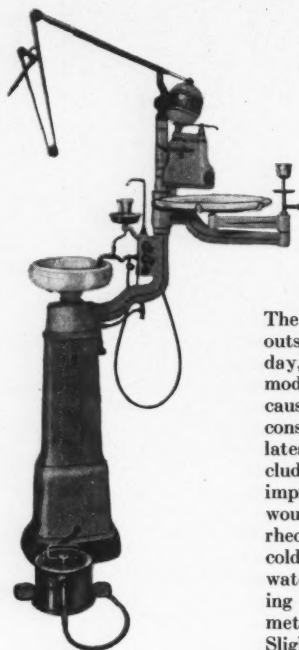
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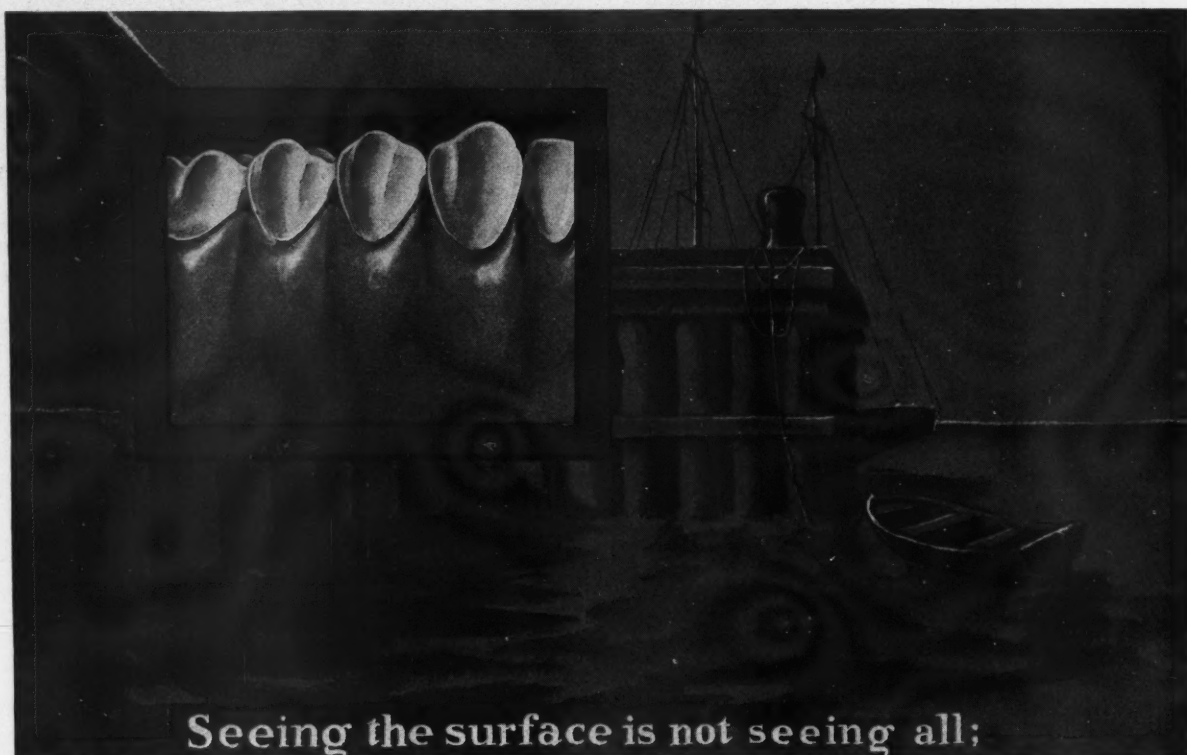
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"Things Are Not Always What They Seem..."



\*This is the third chart in the third series intended for the use of the dentist in explaining important normal and pathologic dental conditions to his patients. The first and second series have been published in booklet form.

# The DENTAL DIGEST

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January, 1936

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An Oral Hygiene Publication.  
Published monthly on the fifteenth  
by Dental Digest, Inc.

Entered as second class matter at  
the Postoffice at Ashland, Ohio, under  
the Act of Congress, March 3,  
1879.

PUBLICATION OFFICES: 1005 Liberty  
Ave., Pittsburgh, Pa.

Merwin B. Massol, Publisher;  
Associates: J. J. Downes, W. Earle  
Craig, D.D.S.; R. C. Ketterer,  
Publication Manager.

Subscription should be sent to  
the Publication offices, 1005 Liberty  
Ave., Pittsburgh, Pa.

Manuscripts and correspondence  
regarding editorial matters should  
be addressed to the editor at 708  
Church Street, Evanston, Ill.

Subscription rates, including  
postage:

\$2 per year in the United States,  
Alaska, Cuba, Guam, Hawaiian  
Islands, Mexico, Philippines, Porto  
Rico. To Great Britain and Con-  
tinent, \$2.75; Canada, \$3.50; Aus-  
tralia, \$2.75. All other countries  
\$2.75. Single copies, 25c.

## DISTRICT OFFICES:

Chicago: Peoples Gas Bldg.;  
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San Francisco: 155 Montgomery  
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## A THEORY OF DENTAL CARIES: ITS CLINICAL APPLICATION

WINFIELD S. FISHER, D.D.S.

Elmhurst, Illinois

I DISAGREE with the pessimistic opinion<sup>46, 51, 68</sup> expressed by some that no marked advance has been made since the days of Miller, Williams, Black, et al. with regard to the determination of the etiology of dental caries. The reason for this pessimism, I believe, is that reviewers of the literature have made the error of attempting to adapt various *conclusions* drawn by workers from their results to *theories* concerning the etiology of caries. When the *facts* are collected, evaluated, and correlated, valuable information is derived. When this information is then considered in the light of clinical application, some of these facts become so profoundly significant that a concept of caries results which brings all the apparently conflicting segments of the puzzle into coherent perspective.

The accompanying tables and drawings are the result of such a procedure. It will be noted that two principal divisions have been made in the segregation of facts. All information derived through experimental, technical, and laboratory endeavor has been grouped under the heading "Facts Derived Through Research." These facts have been classified further according to their relation or application to saliva, bacteria, film, diet, or tooth structure. In assembling the "Facts Derived From Clinical Experience," the facts were grouped according to their significance with respect to incidence, immunity, susceptibility, control, arrest, recurrence, or vital influences.

### FACTS DERIVED THROUGH RESEARCH

The significance of the facts concerning salivary relationship to the caries process is three-fold: First, it becomes apparent that the physical and chemical properties of the saliva are of predisposing, and therefore of secondary importance. Second, the saliva appears to have some determining property which affects the types of bacteria found in the mouth. Clinical observation, however, indicates that of greater significance are those factors of environment influencing the collection and localization of bacteria, and also the type of pabulum incorporated in the oral secretions and

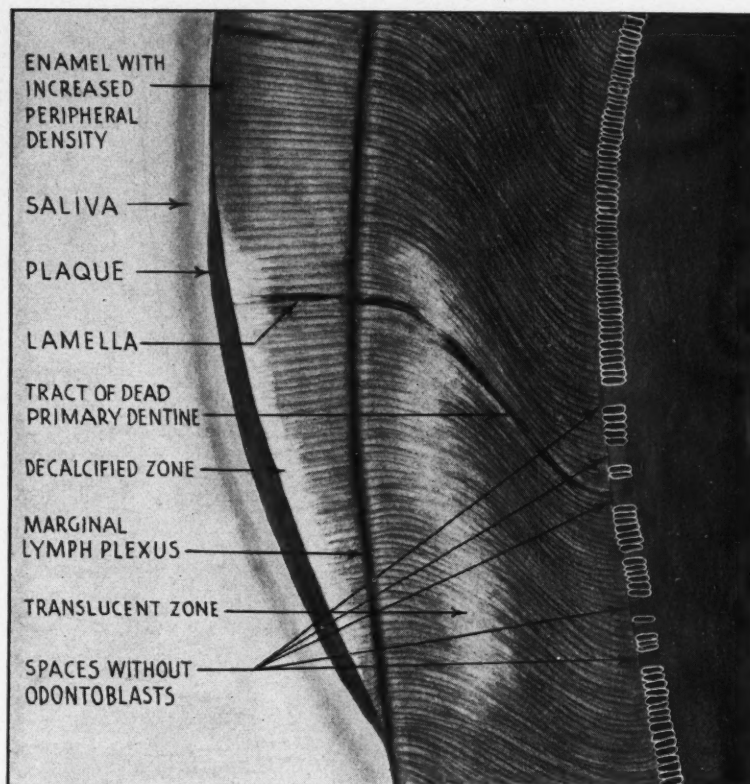


Fig. 1—Schematic drawing to depict tooth structure and reactions to carious irritation. Note the disappearance of the odontoblasts beneath the zone of carious irritation. This phenomenon is the antithesis of the characteristic massing and increases function of the vital protective forces in other tissues and organs of the body to resist invading forces.

in the collections found in the mouth. Third, the *physiologic* property of the saliva, as expressed in its amylolytic property, is of primary importance, because the fermentation of the complicated starch molecule awaits its reduction to simple monosaccharides by the amylase (ptyalin) of saliva.<sup>32, 79</sup>

There seems to be a diversity of opinion in the literature<sup>84, 32</sup> concerning the actual significance of the amylase of saliva in relation to caries, although there is general agreement that there is a relationship. My own clinical observation and analysis of other reports indicates that the carbohydrate in excess of the ready amylolytic powers of the saliva is a primary factor in fermentation caries.

This excess in proportion may be due to (1) the quantity of carbohydrate itself; (2) to the small amount of salivary amylase; or, (3) to its deficient or impaired activity owing to the particle size, state (raw or cooked), or type of carbohydrate in the concretion concerned.

The important contribution with respect to "film" is the fact that the closely adherent plaque is basically bacterial and is inhibitive or conducive to caries as it affects the concentration of acid.

In correlating the observations of Kligler<sup>67</sup>; Goadby<sup>44</sup> and Pickerill<sup>84</sup>; Gies<sup>45</sup>; Howe and Hatch<sup>57</sup>; James, McIntosh, and Lazarus-Barlow<sup>58</sup>; Rodriguez<sup>91</sup>; Bunting<sup>23</sup>, Jay<sup>61</sup>, et al.; Hadley<sup>49</sup>; Marshall<sup>74</sup>; Marion



Johnson, et al.<sup>63</sup>; Bibby<sup>17</sup>; Okumura and Nikai<sup>82</sup>; Clark<sup>39</sup>; Enright and Friesel<sup>35, 36</sup>; and other, the outstanding points are (1) the fact that several bacteria (Table 5) can initiate the primary lesion of caries; (2) the omnipresence of the bacteria; (3) the fact that they belong to either fermentative or proteolytic (putrefaction) processes or both; and (4) the symbiotic and complementary powers of the bacteria as well as the selectivity as to location (Table 6) and their action on carbohydrates.

With regard to diet, no further explanation of its four-fold significance needs to be added than appears in Table 1 under that heading.

The only point that might well be emphasized concerning tooth structure is that the vital forces stressed by some writers are no more than the ordinary inherent properties expected of a pulp functioning in response to any external irritation, whether it is abrasion, attrition, chemical, functional, or carious. The nature of the response is the same in all cases, varying only in vigor, degree, and extent. In fact, since it is known that the dissolution of tooth structure occurs considerably in advance of the bacterial invasion itself<sup>38, 20</sup> the structural changes shown in the drawing of tooth structure (Fig. 1) are actually a response to a *particular type of chemical irritation*.

#### FACTS DERIVED FROM CLINICAL EXPERIENCE

The facts tabulated in Table 2 are self-explanatory. Particular consideration, however, should be given to the following points:

1. Dental caries is universal; it includes all races, all ages, all diets—both meat-eating and cereal and vegetable-eating races; the only variation is in degree or percentage of incidence.

2. Primitive races had caries.

3. No tribe or race is completely free from caries. Although the percentage of incidence may be low in some localities, tribes, or races, *Caries is found*.<sup>86, 78</sup>

4. Immune mouths are of varied, marked, and general activity, and are to that extent self-cleansing.<sup>42</sup>

5. Immune mouths stain as much as others and at any particular time; the *difference* between them and susceptible mouths is *in the length of time the concretions indicated remain stable on the tooth surface*, and in factors relative to self-cleansing powers.<sup>42</sup>

For example, if a saturated solution of gentian violet in absolute alcohol were used as a stain and the

stain were applied to a susceptible mouth and an immune mouth,<sup>42</sup> let us say at eight o'clock in the morning, the stain reaction would appear the same in the two mouths. On subsequent examination, eight or nine hours later, in the case of the immune mouth, the stain would have disappeared; whereas, in the case of the susceptible mouth there would be numerous stained areas remaining which would represent stagnant or susceptible areas. The explanation of this is that the immune mouth is self-cleansing.

To conform to the clinical fact

just described, the saying, "A clean tooth cannot decay," should be corrected to say, "A frequently disturbed area will not decay." This will reconcile the common argument brought against the former saying, inasmuch as sordes can be present but disturbed often enough to prevent concentration of acid. The term "self-cleansed area," therefore, is correct only by implication and is, in fact, merely a *frequently disturbed area*.

6. Caries has been reduced, arrested, and controlled despite complications resulting from systemic disorders.<sup>17</sup>

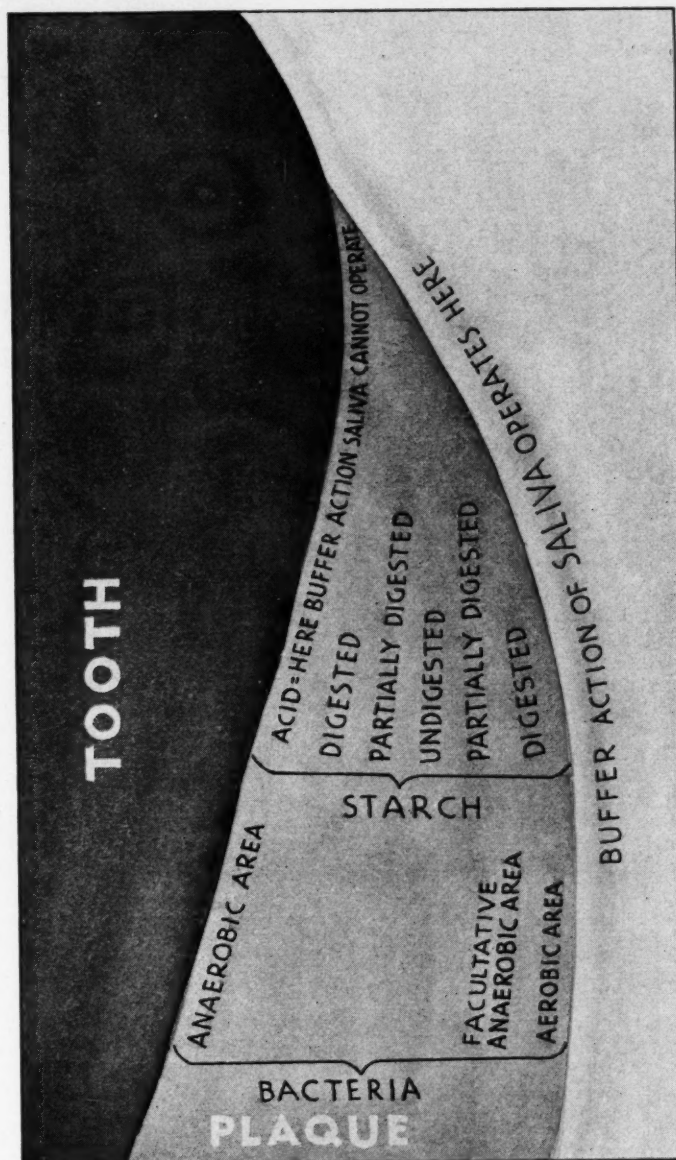


Fig. 2—Schematic drawing of plaque. Bacterial and chemical characteristics of various zones in a fermentative concretion. Zones are not arbitrarily fixed as to depth and location, these being determined by intensity of protection and characteristics of plaque.

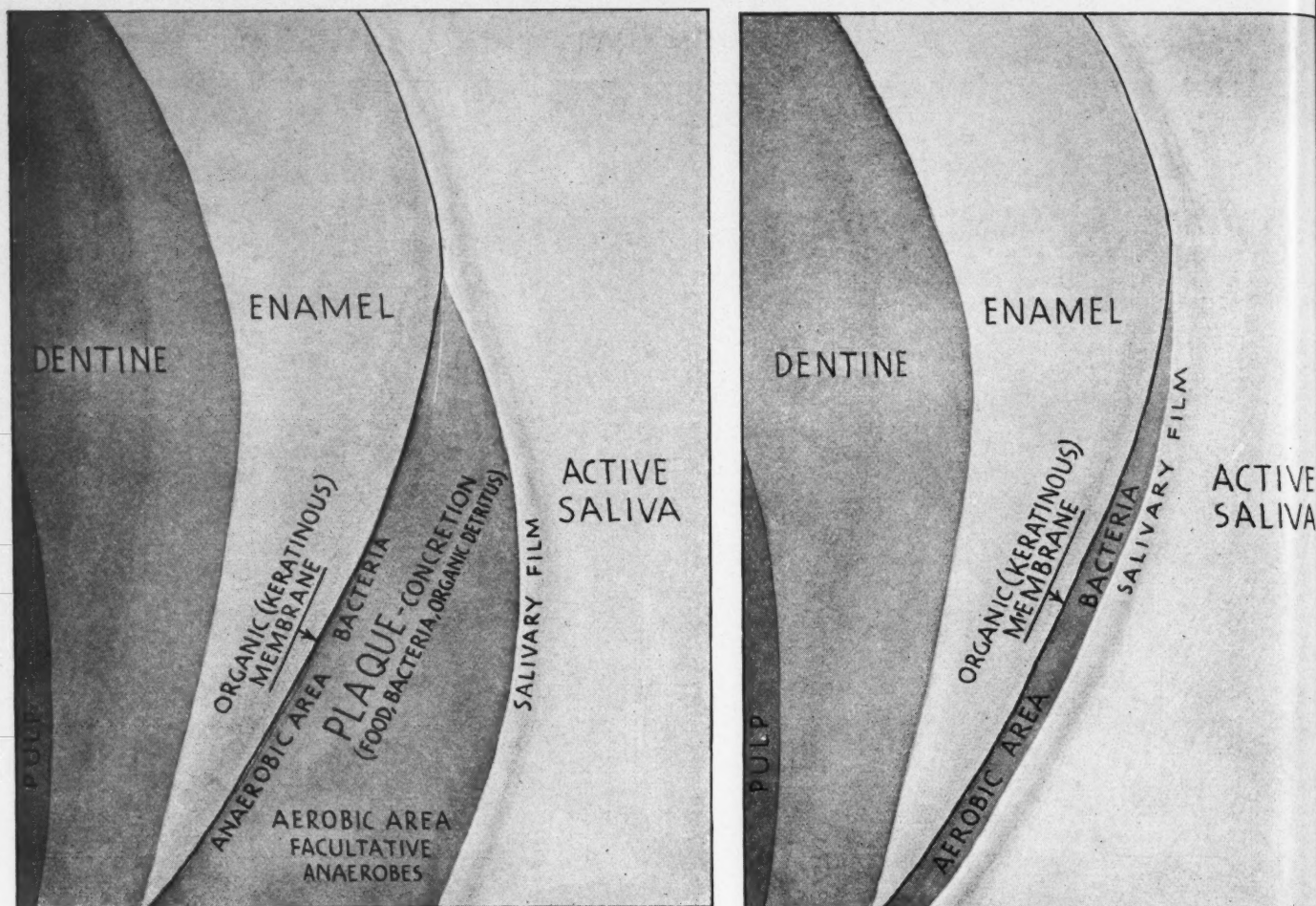


Fig. 3—Drawing of caries-susceptible and caries-free areas. Caries-susceptible area: Collection + Protection + Decomposition + Concentration = Caries. Caries-free area: No stable collection; no protection; decomposition (bacterial activity) but no concentration of its end-products; no caries.

TABLE 1.—Facts Derived Through Research

Saliva	Film	Bacteria	Diet	Tooth Structure
Important as cleansing agent	Omnipresent	Several (Table 5)	Of importance: 1. According to developmental phase	Structure is a predisposing factor
Important as it influences development of collections	Basically bacterial	Can be symbiotic; complementary: selective as to location (Table 6) and action on starches;	2. According to metabolic phase	Offers relatively passive resistance (Fig. 1).
Important as a neutralizing agent	Can inhibit or be conducive to caries	Symbiosis and complementary action can increase acidogenic powers and results	3. As it affects formation of concretions	Vital forces incorporated in tooth as organ offer some resistance to caries (as they offer to any form of irritation: attrition, abrasion)
Important as a medium for bacterial activity	References: 5; 6; 36; 45; 42; 55; 72; 74; 78; 84; 99.	Omnipresent	4. As a source of acid production: (a) Fermentation (b) Putrefaction	No enamel can withstand decalcification
Important as to its amylolytic activity		Fermentative and proteolytic (putrefactive)	References: 1; 2; 7; 9; 13; 16; 17; 18; 19; 25; 28; 31; 33; 36; 41; 50; 51; 54; 55; 56; 64; 66; 67; 72; 73; 75; 76; 83; 86; 87; 88; 89; 93; 97; 98.	References: 3; 4; 5; 8; 10; 11; 12; 15; 20; 29; 34; 35; 38; 39; 40; 42; 53; 62; 73; 75; 100.
pH, Ca, P, ash, CO <sub>2</sub> capacity, total alkalinity, and acid base balance are not directly related to caries		References: 7; 14; 16; 18; 20; 22; 23; 24; 25; 26; 27; 30; 35; 36; 37; 38; 43; 47; 48; 49; 57; 58; 63; 67; 72; 74; 78; 80; 82; 91.		

7. The more stable the conditions affecting oral environment, the longer the period (arrest) between the stages of activity (susceptibility), which points to the following fact:

8. Factors related to resistance to

change in mouth environment determine the intervals of recurrence of caries susceptibility.

9. Tooth form; tooth relation; tooth structure (pits and fissures); tissue relationship; chewing habits;

articulation; occlusion; type, particle size, texture, and consistency of food; state and quantity of saliva; chemical action of food and the action of oral secretions on the food—all these determine the location of

TABLE 2.—Facts Derived From Clinical Experience

Incidence	Immunity	Susceptibility	Control	Arrest	Recurrence	Vital Influence
<p>Dental caries is universal; includes all races, all ages, all diets; both meat-eating and cereal-and-vegetable-eating races; only variation is in degree or percentage of incidence</p> <p>Primitive races had caries</p> <p>Incidence of caries among patients with pyorrhea is in inverse proportion to extent of protection offered susceptible tooth surfaces by calculary deposits</p> <p>Incidence of caries is in inverse proportion to self-cleansing powers of mouth. The frequently disturbed area will not decay</p> <p>Age has no positive or direct relationship to incidence of caries</p> <p>References: 7; 13; 18; 28; 42; 50; 78; 83; 85; 86</p>	<p>General: No tribe or race is completely free from caries</p> <p>Relative immunity despite imbalance of diet</p> <p>"Geographic immunity" where relative immunity exists until removal to other districts with changed living and dietary habits</p> <p>Local: Immune mouths stain as much as others at any particular time; difference is in length of time concretions remain on surface and in factors related to self-cleansing powers</p> <p>Lingual surfaces are generally immune</p> <p>Spaced teeth are generally immune to proximal caries</p> <p>Calculus covered tooth is immune</p> <p>Teeth themselves have definite areas of immunity</p> <p>Unsanitary mouths can be immune</p> <p>References: 7; 13; 16; 17; 28; 35; 42; 18; 50; 68; 74; 77.</p>	<p>General: Caries develops despite balanced diet</p> <p>Caries develops despite all other evidences of good health and normal vital processes</p> <p>Local: Susceptibility can be changed by alteration of dietary habits, components and characteristics</p> <p>Structure of teeth affects rate of decay but not incidence</p> <p>Point of beginning caries determined by environmental factors</p> <p>Particle size, texture, and consistency of food significant in relation to incidence of and susceptibility to caries</p> <p>Rotated teeth, malocclusion, articulation, abrasion affect caries susceptibility</p> <p>Clinical picture and susceptibility to caries is the same in treated teeth as in vital teeth</p> <p>Tooth form, tooth contact, tooth relationship, tissue relationship are important in determining susceptibility to caries</p> <p>Chewing habits affect susceptibility</p> <p>Excess carbohydrate increases susceptibility</p> <p>References: 18; 7; 14; 25; 35; 42; 50; 51.</p>	<p>General: Caries has been reduced, arrested, and controlled despite complications due to systemic disorders</p> <p>All dietary control of caries has been due to the fact that maintenance or attainment of so-called balance has been accomplished at expense of articles which affect formation of concretions and which are prolific sources of acid production</p> <p>Local: "Dry mouth" is an insidious influence on successful control</p> <p>Viscous (ropy) saliva is detrimental to successful self-cleansing, and to that extent also to control of caries</p> <p>Proper extension for prevention stops caries at that particular area until filling breaks down or until gingival recession or some other environmental change exposes margins to recurrence</p> <p>References: 16; 17; 51.</p>	<p>General: Change in dietary habits by its effect upon bacterial flora of mouth can arrest caries</p> <p>Local: Loss of an adjacent tooth can arrest caries on the proximal surface of tooth</p> <p>Further eruption of tooth can arrest caries</p> <p>Increased septal tissue recession can arrest proximal caries</p> <p>Change in eating habits can arrest caries</p> <p>The more stable the conditions affecting the oral environment, the longer the period between states of activity (susceptibility) of carious process; in other words, the longer the period of arrest</p> <p>References: 18; 35; 42; 63; 23; 24; 27; 28.</p>	<p>Factors related to resistance to change in mouth environment determine intervals of recurrence of caries development</p>	<p>Pregnancy, lactation, general physical debility have no direct relation to etiology of caries</p> <p>Malnutrition, aberrations of function and of structural development are predisposing factors in so far as they affect tooth structure and environment</p> <p>Endocrine disturbances affect structure and development</p> <p>References: 18; 35; 42; 52; 64; 65; 66; 73; 74; 78; 87; 92; 95; 96.</p>



TABLE 3.—Evaluation

Research					Clinical Phase
Saliva	Film	Bacteria	Diet	Tooth Structure	
Primary factor as it affects fermentation	Predisposing factor as it affects concentration of acid	Predisposing factor as they produce acid	Primary factor as a source of acid-ogenic activity	Predisposing factor as it resists acid	Caries is universal. Predisposing: Immunity, susceptibility, control, arrest, and recurrence (all associated with environmental influences and tendencies). Also variations in development, metabolism, and function.
Predisposing factor as it affects concentration of acid			Predisposing factor as it affects concentration of acid		Primary: Environmental factors affecting collection, protection of decomposing food, and the concentration of its end-products.
Predisposing factor as it affects the production of acid			Predisposing factor as it develops acid		Frequently disturbed areas will not decay.
			Predisposing factor as it favors collections		Protection involved is some combination of bacterial; structural; functional; relational; tissue, food, salivary, or chemical nature.

TABLE 4.—Correlation

Definition:	Dental Caries is the dissolution of tooth structure resulting from the concentration, in protected areas in and about the teeth, of the end-products of disintegrative aciduric and acidogenic bacterial action on food concretions.
Types:	<p>Fermentation caries and Putrefaction caries:</p> <p>Fermentation caries is dependent on the collection of carbohydrate in excess of the ready amylolytic powers of the saliva of that particular patient and a degree of protection sufficient to favor fermentation and concentration of its end-products to such a degree that decalcification of the tooth surface involved results.</p> <p>Putrefaction caries requires such protection as will permit concentration of end-products of proteolytic decomposition in sufficient strength to attack the tooth surface.</p>
Forces:	<p>Disturbing and Resistant</p> <p>Disturbing forces will limit size and determine position of protected area.</p> <p>Resistant forces will determine degree of stagnation and protection.</p>
Determining and Dependent Factors:	<p><i>Degree of Protection</i> and stagnation will determine <i>length of time</i> bolus or concretion remains in position and concentration of activity involved in its disintegration.</p> <p><i>Length of Time</i> determines amount of <i>chemical change</i> and <i>bacterial activity</i>.</p> <p><i>Chemical Change</i> depends on amylolytic factor, character of concretion, etc.</p> <p><i>Bacterial Activity</i> depends on medium, amount and type of conversion, supply of pabulum, virulence, and combination of organisms involved, degree of protection, etc.</p> <p><i>Disintegration of Tooth</i> depends on amount and concentration of acid, structure of tooth, length or frequency of exposure, etc.</p> <p><i>Degree of Acid Environment</i> eliminates all bacterial activity except that of aciduric and acidogenic organisms; it also determines localization of these organisms according to their acid tolerance.</p> <p><i>Speed of Conversion</i> of starch depends on amount of ptyalin; its amylolytic activity; particle size; texture; type; and state (raw or cooked) of carbohydrate involved.</p>
Equation:	<p>Collection + Protection + Decomposition (Fermentation) + Concentration = Caries: (Putrefaction)</p> <p>Regardless of tooth structure, metabolism, systemic conditions, age, development, etc.</p>

TABLE 5.—Aciduric and Acidogenic Bacteria\*

Name	Properties
C. Placoides	Plaque formation; decalcification
L. Buccalis	" " "
N. Flavus	" " "
N. Perflavus	" " "
B. Mesentericus	Decalcification
B. Acidophilus	" proteolysis
Staph. Albus	" "
Strep. Mutans	" "
B. Putrificus	" (weak) "

\*With variations in tooth structure, protection, and concentration of acid seen in the clinical picture of caries, any number of or all these organisms (possibly except B. Putrificus) may initiate the primary lesion of caries.

TABLE 6.—Localization of Decalcifying Bacteria\*

Name	Surface	Enamel	Dentine	Pulp
C. Placoides	→	→		
L. Buccalis	→	→		
B. Acidophilus	→	→	→	→
B. Mesentericus	→	→		
N. Flavus	→	→		
N. Perflavus	→	→		
Staph. Albus	→	→	→	→
Strep. Mutans	→	→	→	→
			(Name)	
			← B. Putrificus →	

\*Indicates the selective localization of the bacteria mentioned. It will be noted that all these bacteria may be found on the tooth surface, but as the caries process progresses toward the pulp only those of strongly aciduric properties are found. These are both of decalcifying and proteolytic types.

beginning caries in any mouth.

10. The protection necessary for concentration of acid in sufficient strength and amount for dissolution of tooth structure is some combination of bacterial, structural, functional, relational, tissue, food, salivary, or chemical nature. It is incompatible with the clinical picture of caries to accord such protection necessary for this acid concentration solely to the presence of some membranous-like film as it is commonly conceived.

#### EVALUATION (TABLE 3)

**Research Phase**—Saliva as it affects concentration of acid, and the production of acid; film in so far as it affects the concentration of acid; bacteria in so far as they produce acid; diet as it affects the concentration of acid, as it develops acid, and as it favors collections; tooth structure as it resists acid—all these are predisposing factors in dental caries.

Saliva as it affects fermentation is a primary factor in the etiology of dental caries. Diet as a source of acidogenic bacterial activity is likewise a primary factor in the etiology of caries.

**Clinical Phase**—Immunity, susceptibility, control, arrest, and recurrence are all intimately related to and associated with environmental influences and tendencies.

Environmental factors affecting collection and protection of decomposing food and the concentration of its end-products are of primary importance in the etiology of dental caries.

#### CORRELATION

1. The fact that dental caries may be of two kinds (fermentation caries and putrefaction caries) is in conciliation with the evidence showing decalcification possible from fermentation and putrefactive organisms; also with evidence of caries among car-

nivorous, omnivorous, and vegetable-and-cereal-eating races.

2. By relating this division of Table 4 with Fig. 2 the conception of a carious plaque is clarified. When Fig. 3 is then examined, it becomes apparent that the significant difference between a carious and a non-carious surface is only one of protection and concentration with the equation for caries, therefore, reading as follows:

3. Collection + Protection + Decomposition (fermentation or putrefaction) + Concentration = Caries. This is true regardless of tooth structure, metabolism, systemic condition, age, development, and so on.

4. The definition of caries then becomes: the dissolution of tooth structure resulting from the concentration, in protected areas in and around the teeth, of the end-products of disintegrative aciduric and acidogenic bacterial action on food concretions.

#### SUMMARY

The evolution of dental caries is developed in outline form in Table 7. With this conception of the etiology and clinical picture of dental caries in mind, all the physiologic, chemical, bacteriologic, and physical factors involved in this phenomenon fall into logical sequence.

#### CONCLUSIONS

Examination and consideration point irrefutably, I believe, to the following:

1. Dental caries is nonpathologic and nonspecific in origin. Dental caries is nonpathologic as concerns the human entity; nonspecific with regard to any particular, specific organism.

2. Dental caries is of two types: fermentation caries and putrefaction caries, although fermentation caries is by far the more common type. This concept of caries is an amplification of, and is in accordance with, the well established facts elaborated by Miller,<sup>80</sup> Williams,<sup>100</sup> and Black.<sup>14</sup>

3. The primary factors in both types of caries are chemical and environmental. The chemical factor is that whereby disintegration of food collections by the action of aciduric and acidogenic bacteria normally found in all mouths may take place. By the environmental factor in caries is meant the condition in which such a concentration of the acid end-products of this disintegrative phenomenon may develop that whatever part or type of tooth structure is included becomes disintegrated by decalcification and proteolysis.

4. The development of dental caries is, therefore, intimately associated with natural physiologic processes and specific treatment is unlikely of attainment. All treatment will continue to be empiric and individualistic.

5. With the bacteria involved in caries varying so much in number and characteristics, successful results of immunologic attempts appear doubtful in their practical application.

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TABLE 7.—*The Evolution of Dental Caries*

First Stage: Incorporation of Food with Saliva by Chewing, etc.

Second Stage: Localization of Concretions

Eating habits  
Chewing habits  
Bacterial activity  
Chemical action on food  
Type of food  
Consistency of food  
Dry mouth  
Particle size of food  
Tooth form  
Tooth structure (pits, fissures, etc.)  
Tooth relationship (contact, etc.)  
Occlusion  
Articulation  
Tissue relationship  
Salivary consistency (viscosity, etc.)

Third Stage: Digestion of Concretion to Limit of Powers of Incorporated Saliva

Fourth Stage: Degeneration of Concretion Remaining after Third Stage

Fermentation

Aciduric bacterial activity  
Type of carbohydrate  
Amyolytic power of saliva  
Dry mouth

Consistency of saliva  
Protective power of saliva  
Virulence of bacteria  
Number of types of bacteria  
Symbiosis of bacteria  
Degree of protection  
Number of areas  
Types of protection  
Bacterial  
Food  
Tissue  
Tooth  
Form  
etc.

Carbohydrate (Hydrolysis)

Amyolytic power of saliva  
Type of carbohydrate  
Particle size of carbohydrate  
Texture of carbohydrate

State (raw or cooked)

Degree of protection and its effect upon time required for digestion

Protein (proteolysis)

Uncertain in Mouth

\*Putrefaction

Aciduric bacterial activity (acidogenous and proteolytic)  
Saliva (Protective power; consistency)

B. mesentericus  
Staph. albus  
Strep. mutans

Protection  
Type and consistency of food  
Texture of food

Fifth Stage:

Dissemination of End-Products of aciduric and acidogenic bacterial activity\*\*

Immunity

Highly active oral environment  
Completely self-cleansing  
Excellent tooth structure  
Foods inhibitive to localization and development of concretions  
Eating habits  
Stability of environment

Poor Concentration: no caries or etched enamel: aerobic growth

Concentration of End-Products of aciduric and acidogenic bacterial activity

Caries Susceptibility

Temporary: arrested incipient caries; arrested caries; no caries: with excellent tooth structure; etc.

Intermittent: slow caries; no caries; periods of immunity rest) and susceptibility (activity)

Relatively constant: caries regardless of structure; rapid caries in case of poor structure; virulent bacteria; poor self-cleansing; favorable saliva and food

General: numerous areas and cavities (extensive caries)

Scanty: few areas and cavities (limited caries)

\*All work has involved carbohydrate; none on acidogenous phenomena involved with proteolysis and putrefaction.

\*\*It is not the presence of bacterial flora but the concentration of their activity that is significant.



TABLE 8.—Conclusions

1. Dental caries is nonpathologic and nonspecific in origin.
2. The Primary Factor in both fermentation and putrefaction caries is chemical in origin; it is the factor whereby disintegration of food collections by the action of aciduric and acidogenic bacteria normally found in all mouths may take place.
3. The Secondary Factors are environmental; they are the factors whereby such a concentration of the end-products of this integrative phenomenon may develop that whatever part of the tooth surface is included becomes dissolved by decalcification and proteolysis.
4. The Process of Dental Caries, therefore, is so intimately associated with natural physiologic processes that specific treatment is unlikely to attainment and all treatment will continue to be empiric and individualistic.

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# CLASSIFICATION AND TREATMENT OF POSTERIOR TEETH

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AS EARLY as 1920 attention was called to the greater susceptibility of occlusal surfaces of first permanent molars to dental caries. A limited number of examinations showed these surfaces to be from five to eight times as susceptible as the other surfaces of these teeth; namely, mesial, buccal, distal, and lingual.

I became interested in this subject in 1925 and in July, 1929 read a paper<sup>1</sup> which included the "Classification and Treatment of the First Permanent Molar." The classification and treatment described here have been practiced since that time on all posterior permanent and deciduous teeth with a high degree of success in eliminating and controlling caries.

## CLASSIFICATION

*Class 1*—Class 1 includes all posterior teeth with well-rounded cusps and well-rounded grooves which are completely closed but shallow (Fig. 1).

*Class 2*—Class 2 comprises all posterior teeth with pointed cusps, in which the grooves are closed but deep and accentuated (Fig. 2).

*Class 3*—All posterior teeth with grooves and pits that are completely closed with enamel, commonly called fissures, are included in Class 3 (Fig. 3).

## TREATMENT

To be most successful with the following prescribed treatment, it should be instituted as soon as the surface of a posterior tooth is exposed through the mucous membrane. From a few minutes to one-half hour spent in properly preparing these posterior teeth undoubtedly will add many years to the normal life of these teeth by decreasing the incident of caries.

*Class 1*—Posterior teeth falling in the first classification need little attention other than ordinary home care and regular prophylaxis by the dentist. The occlusal surface at the time of eruption should have all grooves and pits thoroughly scraped

<sup>1</sup>Sweet, C. A.: Classification and Treatment of the First Permanent Molar, Proc. & Scient. Papers, Pacific Coast Dent. Conf., page 189, 1929.



Fig. 1—Tooth that is not deeply grooved (Class 1).



Fig. 2—A deeply grooved tooth (Class 2).



Fig. 3—A pit and fissure defect extending below the dento-enamel junction. The shaded area represents the cavity outline; the dotted lines, the corrections on the occlusal structure (Class 3).

with sharp instruments and polished to a high degree, thereby making it possible for the home care to be more efficient.

*Class 2*—Posterior teeth falling in the second classification of deep and accentuated grooves completely closed with enamel should be cared for as soon as the surfaces to be treated are exposed through the mucous membrane, in the following manner:

1. All pits and grooves are thoroughly cleaned with fine explorers and then the entire surface is polished with pumice on conveniently-shaped brushes revolving at high speed.

2. All pits and grooves are next enlarged by using a number 5 or number 6 round bur in the straight hand-piece. The operator should make sure that the bur is not allowed to cut into the enamel at the base or bottom of the groove or pit.

The thickness of the enamel over the dentine should not be decreased but the grooves should be widened and the pits enlarged so that easy access to the cleansing action of the toothbrush and also the flushing and cleansing action of the normal excursions of food is insured.

A larger or smaller round bur may be found more convenient in opening these grooves or pits.

3. Following the use of the bur, mounted stones, number 30 S. S. White or number 370 Miller, the small inverted cone type, in the contra-angle handpiece are used further to enlarge the orifices of the grooves and pits and as a leveler of enamel by placing the stone in the bottom of the grooves or pits and drawing it upward toward the tip of the cusps, thereby clearly exposing the base of the groove or pit.

4. The tooth is next thoroughly polished with sandpaper and cuttlefish discs, orangewood points, and brushes carrying flour of pumice and chalk. This finally produces a highly polished accessible surface.

With these steps carried out the Class 2 tooth now becomes a member of the first class, thereby decreasing its susceptibility to the destructive processes of caries. If, as I believe, the quantitative bacterial contamination of the mouth is a factor in caries,

according to Bunting, Jay, and others, the one way of helping to reduce this contamination is cleanliness (Fig. 4). If the teeth are put in a condition whereby they are more easily kept clean, the susceptibility to caries should decrease.

*Class 3*—Posterior teeth having fissures must have a restoration, preferably of silver amalgam or gold, as the dentine is at least microscopically exposed to the destructive processes in the mouth.

At the time when the surface of the tooth is first exposed the fissure, or fissures, can be most simply opened with a number 33½ inverted cone bur, followed by a number 35 inverted cone bur in the contra-angle handpiece. These should be followed by a tapered fissure bur to remove excessive undercuts, and a mounted

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Fig. 4—Solid line shows a deeply grooved tooth before operative correction. Dotted lines show the outline of the tooth after correction.

stone to establish smooth margins. The filling of choice is silver amal-

gam. At a later age, either a gold inlay or gold foil restoration can be used.

After the insertion of the restoration, the surfaces of the tooth and restoration should be polished to conform to a Class 1 tooth. This, again, reduces the possibilities of further caries and assists mouth cleanliness (Fig. 3).

#### CONCLUSION

If the treatment described is conscientiously adhered to for all posterior teeth, it will tend to prevent the localization of bacteria at a definite point. It will also decrease the possibilities of the accumulation of fermentable food substances, and prevent the groove, pit, or fissure from harboring the resultant acids that break down the tooth structure and form cavities.

## AN UNUSUAL MASSIVE FORMATION OF SALIVARY CALCULUS

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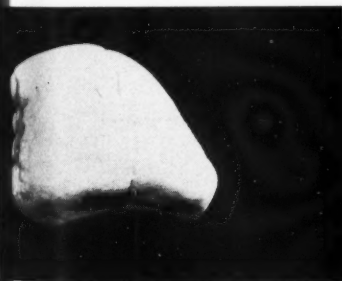


Fig. 1—Buccal view of the mass.



Fig. 2—Roentgenogram of mass after removal.

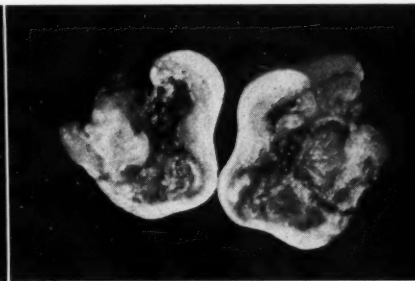


Fig. 3—Mass separated at its division showing laminated appearance of calculus. Each section contains a molar tooth.

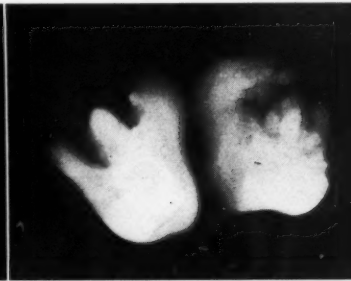


Fig. 4—Roentgenogram of mass after separation, showing teeth.

**T**HE patient, a woman, aged 79, presented with the following note from her physician: "This patient presents an unusual tumor growth. Please take care of her."

*Examination*—Examination revealed a hard, dense mass, yellowish light brown in color, which felt like stone. The mass measured about 3.5 cm. by 2.5 cm. by 1.5 cm. It was

divided into two sections, each of which was movable. This mass was located in the region of the upper right molars. The patient had no upper bicusps or lower molars on this side. She had just recently become aware of the presence of this mass. The mucosa surrounding the mass was purplish red.

*Diagnosis*—Salivary calculus com-

pletely surrounded the right upper first and second molars except for the tip of the lingual roots which served as a means of attachment to the upper jaw.

*Treatment*—Treatment consisted of the removal of the mass and teeth. This mass was picked out with the thumb and index finger without the use of an anesthetic.

4259 West Madison Street.



# THE MANAGEMENT OF SOFT TISSUE IN DENTAL OPERATIONS

DON E. WOODARD, D.D.S., M.S.D.,

Kansas City, Missouri

THE proper management of flaps and the mucosa in dental operations cannot be emphasized too much. Carelessness or ignorance often results in a mutilated ridge and an unesthetic result. By the application of a few simple principles, we can contribute to our patients a service that is beneficial. We can obtain a smoother, more uniform result, quicker healing with less postoperative pain, fewer complications, and eventually more comfort from the artificial restorations.

Success of the operation depends on the proper approach in surgical removals. A large flap, well extended (Plate 1, 1a, 2a, and 1b), gives good vision, easy access, and heals quickly with no exposure of the process or failure to unite; whereas the errors shown in the remaining designs on Plate 1 frequently cause the operator a great deal of difficulty and bring down unjust criticism of the operation.

## FLAP REQUIREMENTS

1. Flaps must be wider at the base than at any other point.

2. Flaps must be designed in line with the blood supply.

3. Flaps must be extended far enough and cut to the proper depth at the same time, so that the edges are not mutilated nor the mucosa traumatized during operation.

4. The flaps must be large enough to furnish an unobstructed view of the operative field and should be of such size that they can be retracted sufficiently from the operative field.

5. The designs must be such that the flaps may be returned to place with the line of incision supported by bone.

## PRINCIPLES OF FLAP DESIGN

In creating designs for mandibular third molar operations, one should keep in mind the principles of flap design (Plate 2). The larger the flap, the better vision and access. There is no other factor that assists so much in the operative technique. To attempt to remove a difficult impaction through a small slit is unwise. The impacted tooth should be ex-

posed. Soft tissue heals more readily than bone and much needless trauma and bone destruction can be prevented by proper vision. Furthermore, if the edges of the flap are easily retracted, they are not lacerated and traumatized by manipulation.

The same principles apply to the removal of buried root tips.

## TREATMENT OF MUCOSA

There are several factors in the treatment of the mucosa in an alveolectomy which should be considered; on these factors rests the eventual success of the operation (Plate 3):

1. The mucosa should be freed from the bone throughout the entire periphery, both buccally and lingually, so that the alveolar process can be thoroughly examined, trimmed, and smoothed without traumatizing the soft tissue.

2. It is necessary to raise the palatal tissue for a short distance to facilitate leveling the interproximal septums and suturing.

3. Wherever edentulous areas are present, a triangular piece of tissue may be removed adjacent to the socket to facilitate a smooth result and partial closing of the opening as is done at the distal of the second molars in the illustration.

4. The edges of the mucosa should be trimmed in order that no excess may be present to form a flabby ridge.

5. In a full alveolectomy, incisions should be made over the *interproximal bone* between the cuspid and bicuspid (never over the cuspid eminence) to prevent tearing the tissue during manipulation.

6. The suture should always be placed over the interproximal bone, never over the socket.

## SUGGESTIONS

When an isolated tooth is to be removed, there is frequently a bulge of tissue and process at the gingival. Plate 3, (A) shows what can be done to produce a smooth and uniform ridge.

A mattress suture is the only type that is likely to hold when the tissue has been incised or torn down the center of the socket. It is necessary

to undermine and loosen the tissue adjacent, as the edges must overlap (Plate 3, B).

The buccal and lingual plates can often be trimmed and smoothed without incision and the socket partly collapsed by a suture across the top (Plate 3, C).

To assure comfort it is always necessary to smooth the bony edges, both buccal and lingual, under sutured flaps. The operator should be sure to provide a deep enough bite so that the suture does not cut out. The knot is important, for if it does not hold, the flap will fail; moreover, the knot should be square. If there is any doubt as to whether the knot will hold, it should be tied several times (Plate 3, D).

Frequently single teeth are extracted with pyorrhea pockets on the mesial or distal, or both. A distinct service can be rendered if the excess tissue over these pockets is trimmed away, and the flap made accordingly and sutured tightly around the neck of the adjacent teeth (Plate 3, E).

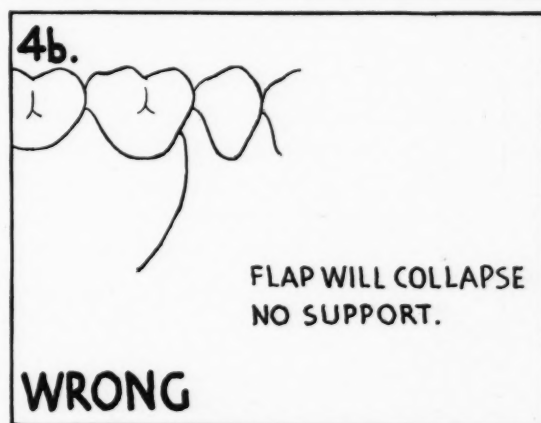
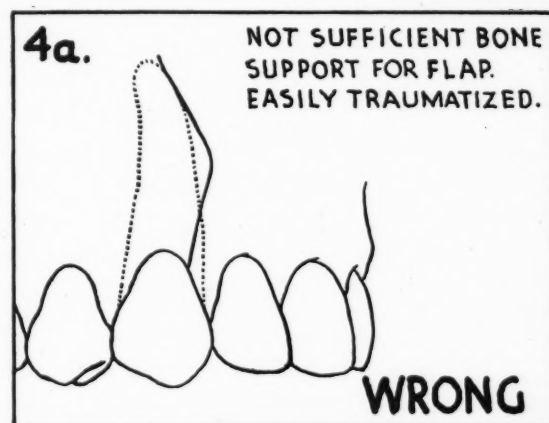
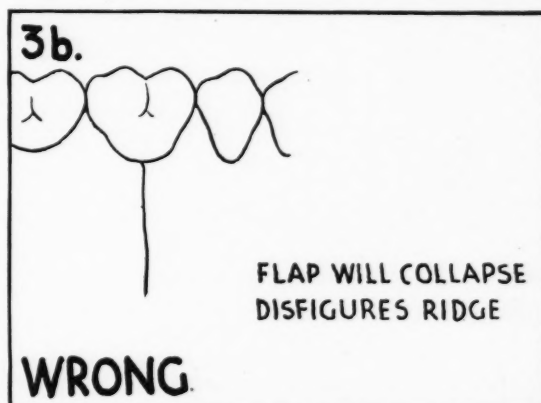
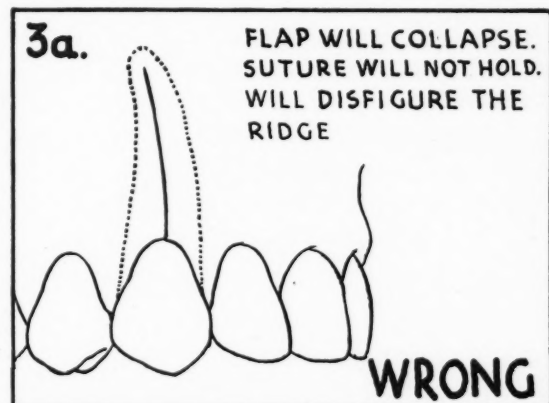
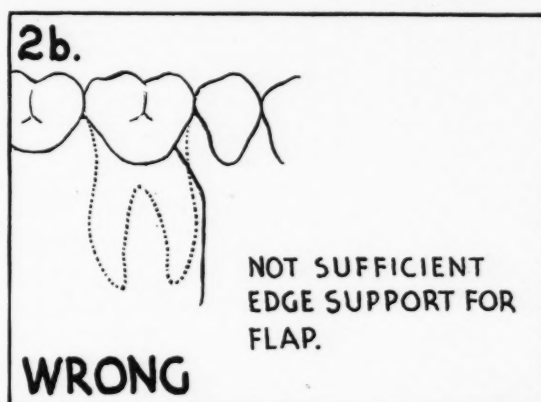
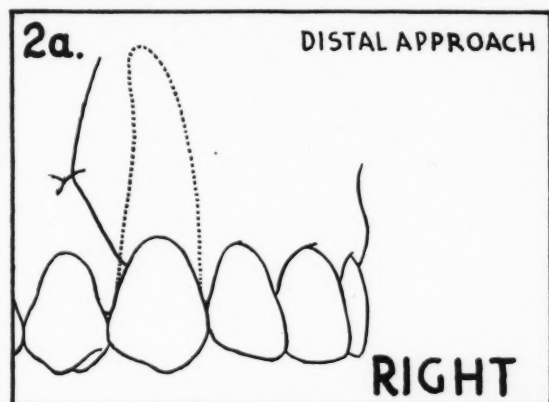
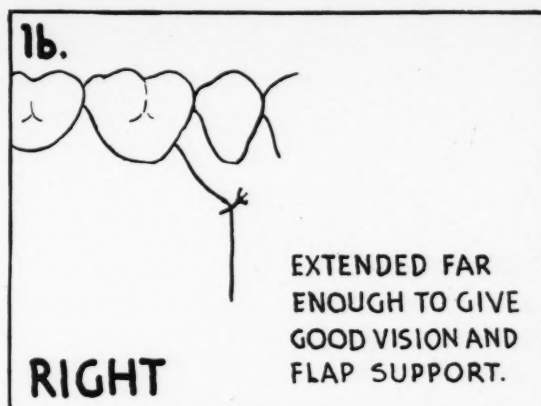
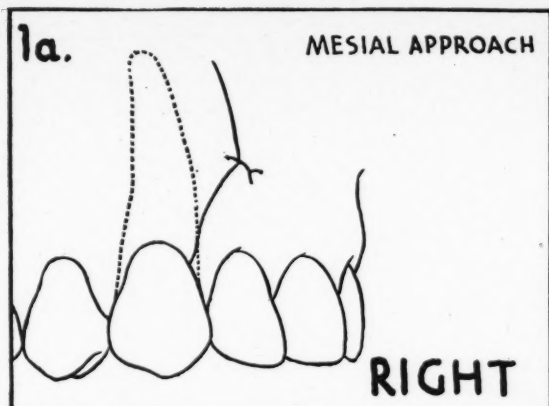
It may be well to repeat that there is no factor that predisposes to operative failure more frequently than failure to plan a flap that will provide sufficient vision and access.

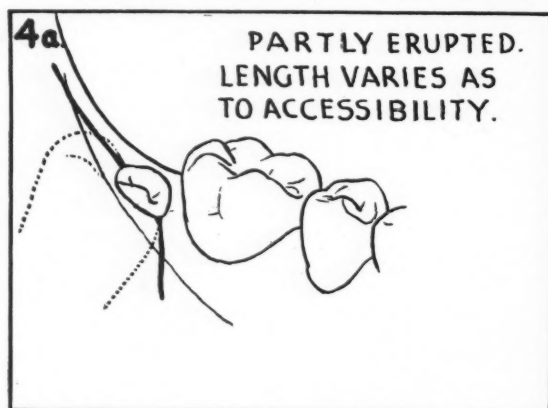
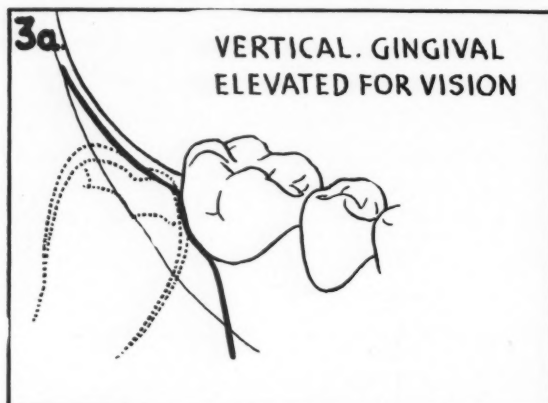
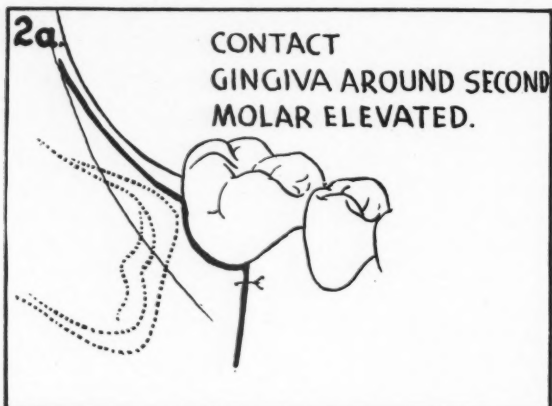
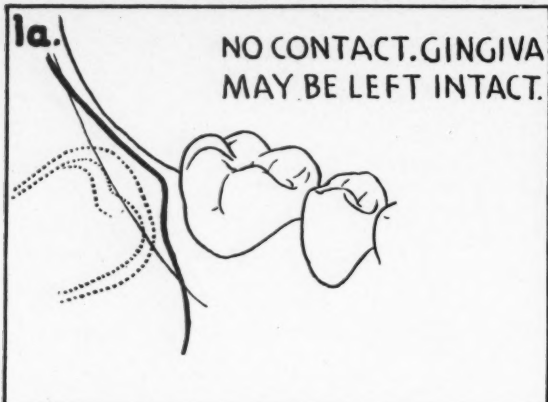
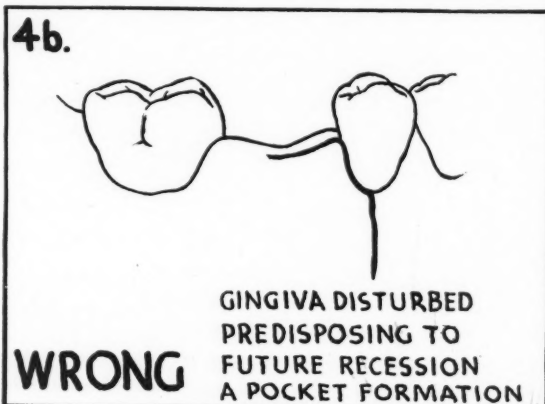
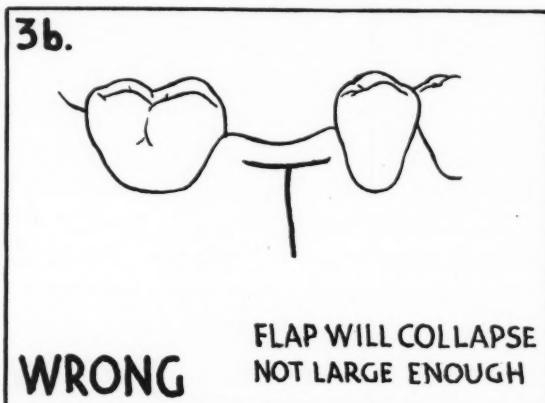
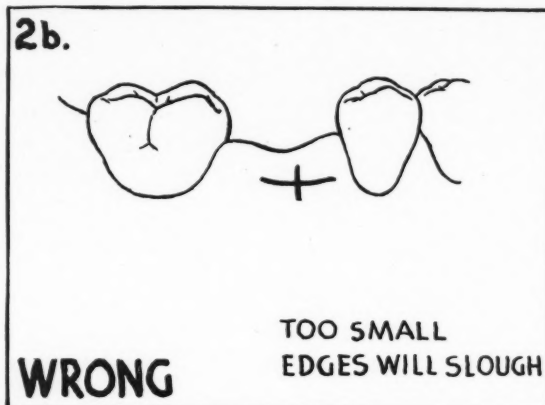
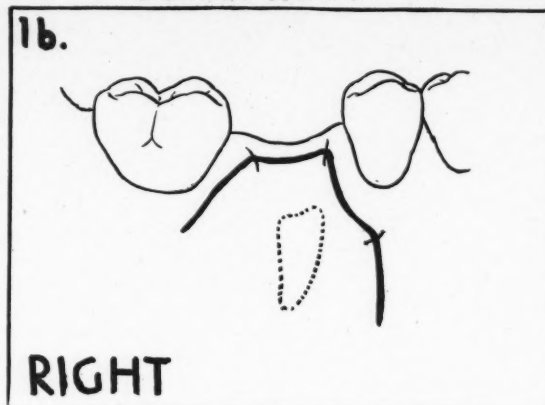
Plates

2 and 3

on pages

18 and 19



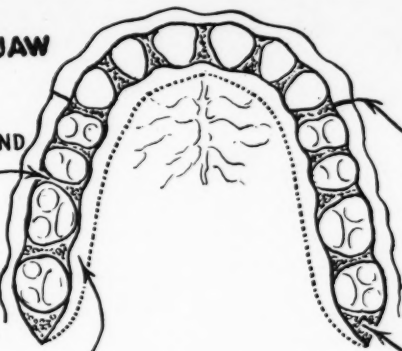
**IMPACTED THIRD MOLAR FLAPS****BURIED ROOT**



**FLAP REQUIREMENTS****ALVEOLECTOMY OF UPPER JAW**

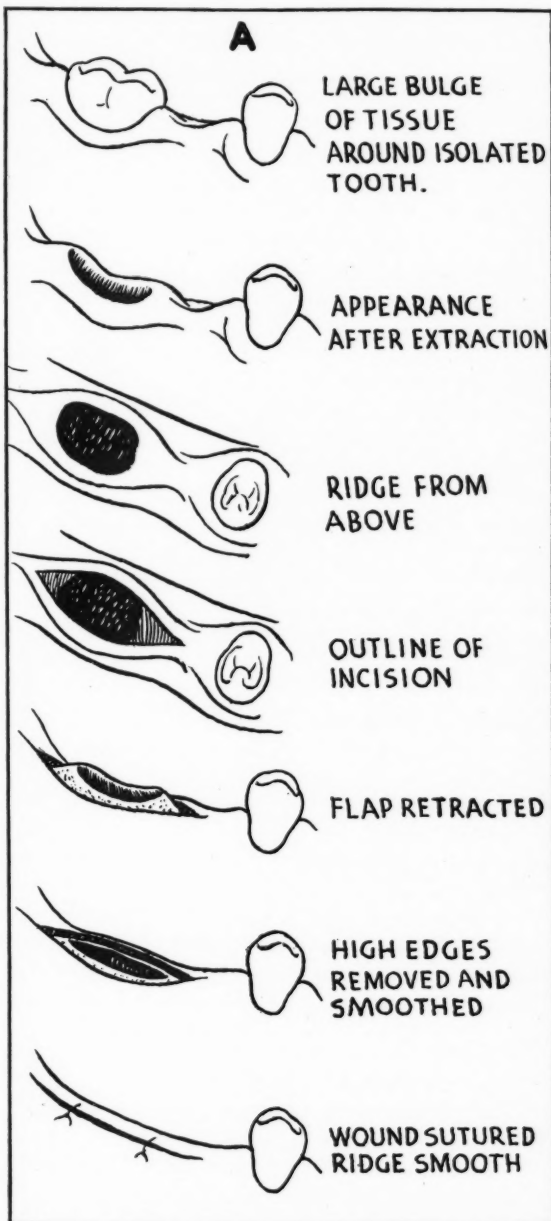
INTERPROXIMAL TISSUE  
REMOVED TO SMOOTH AROUND  
EDGES

PALATAL-MUCO-PERIOSTEUM  
RAISED TO FACILITATE  
SMOOTHING INTERPROXIMAL  
BONE SEPTUM & SUTURING

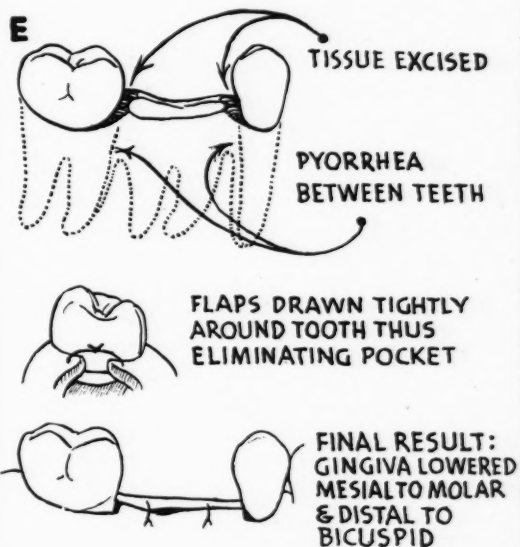
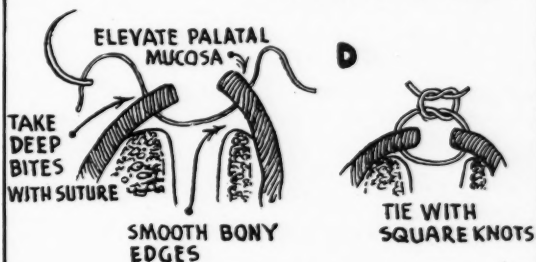
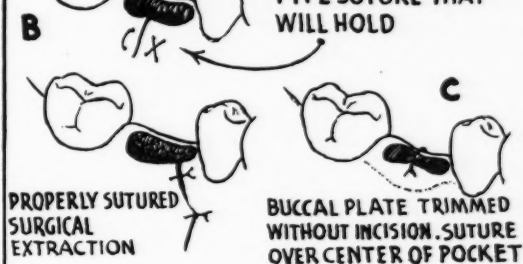


CUSPID INCISION MADE  
AT INTERPROXIMAL  
FOR SUPPORT OF  
INCISION LINE

TRIANGULAR PIECE REMOVED  
TO ASSIST CLOSURE AND  
ELIMINATE FLABBY RIDGE  
IN TUBEROSITY REGION

**FLAP & SUTURE REQUIREMENTS**

MATTRESS REPAIR-  
BUCCAL TEAR ONLY  
TYPE SUTURE THAT  
WILL HOLD



## The Editor's Page

IN a publication by Cyril H. Howkins in England,<sup>1</sup> the mortality and occupational diseases of dentists is discussed. Howkins points out that the mortality rate for dentists is generally somewhat lower than for physicians. This slight increase is in his opinion due to the greater incidence of respiratory diseases and accidents among physicians. Dentists, he observes, are more susceptible to tuberculosis, diabetes mellitus, and diseases of the digestive tract. This writer classifies the occupational diseases of dentists into four general groups: those due to posture, infections, disturbances of the nervous system, and drugs. Under the heading of posture, Howkins observes the following occupational conditions among dental surgeons: drooped right shoulder and bent second finger; flat feet, varicose veins, hemorrhoids; premature alopecia due to excessive heat from operating lights; gastrointestinal conditions as a result of irregular meals and "nerve strain."

Under the classification of infection, Howkins says that dentists are particularly susceptible to acute respiratory infections from contact with patients. Also the incidence of extragenital syphilis, although much lower than for physicians, is still an occupational hazard for dentists. Dentists are liable to infection of the eyes from debris thrown into their faces during operative procedures. Although Howkins suggests that there are some particular diseases of the nervous system that have an occupational significance to dentists, he does not point out a specific condition that might come under this classification. Idiosyncrasies and sensitivities in connection with drug therapy are seen as novocaine dermatitis. This author discounts the danger of chronic mercurial poisoning from the digital manipulation of amalgams.

In summing up, Howkins says, "Ours is a healthy occupation. The main diseases from which our profession suffers are the influenzal group and nasal sinusitis due to direct infection, and gastric troubles due, probably to irregular meals and our sedentary life."

To see whether Howkin's observations had any validity in the United States, we have examined the mortality experience of the policy-holders under the American Dental Association group contract. In the 505 death claims paid within the last five years,

we find that the five chief causes of death, classified in order of highest incidence, are: (1) heart disease in its various forms, both acute and chronic; (2) cancer with a particular selectivity of the stomach; (3) cerebral hemorrhage; (4) accidents, none of which was apparently associated with occupation; (5) pneumonia.

Because Howkins made a comparison between physicians and dentists, we examined the report of the American Medical Association<sup>2</sup> for the death records of physicians who died in 1934. In comparing the mortality experience, we find that like dentists, heart disease causes the greatest number of deaths; cerebral hemorrhage was second; pneumonia, third; cancer, fourth; arteriosclerosis, fifth. This comparison of the mortality of dentists and physicians is not intended to represent any precise actuarial statistics. It does suggest, however, that Howkins' observations in England is partly true in the United States; that physicians are more susceptible to respiratory diseases (pneumonia, third among physicians; fifth among dentists). We were not able to find, however, a similar situation in American statistics concerning the high mortality rate in England from diabetes and tuberculosis among dentists; nor is there evidence to substantiate Howkins' assertion that gastro-intestinal disease is an important direct cause of death unless the incidence of cancer (second place, dentists; fourth place, physicians) would make this deduction valid.

Although the observations made here are based on statistics which are inadequate in method, details, and numbers to be definitive, it was striking to observe the number of accidental deaths among dentists. Of these deaths the automobile was responsible for the greatest number. An alarming fact is suggested in the report that 4 per cent of the death claims to beneficiaries of the American Dental Association group insurance was for deaths by self-destruction.

This entire subject should be further considered in greater detail by competent actuaries. These observations suggest that there are peculiar hazards in the professional man's life which seem to throw a terrific burden on the circulatory mechanism. The mounting toll of death from heart disease is probably more than a problem in pathology; it also reflects a cultural-social form that is too swift, too intense, too energetic.

<sup>1</sup>Howkins, C. H.: Mortality and Occupational Diseases of Dental Surgeons, *Proc. Roy. Soc. Med., Section of Odontology*, 29:1-5 (Sectional page) November, 1935.

<sup>2</sup>Editorial: Obituaries of Physicians Published in 1934, *J. A. M. A.* 104:1242 (April 6) 1935.

# A CAVITY PREPARATION FOR CLASS FIVE PORCELAIN INLAYS

L. Z. McCLUNG, D.D.S.  
Birmingham, Alabama

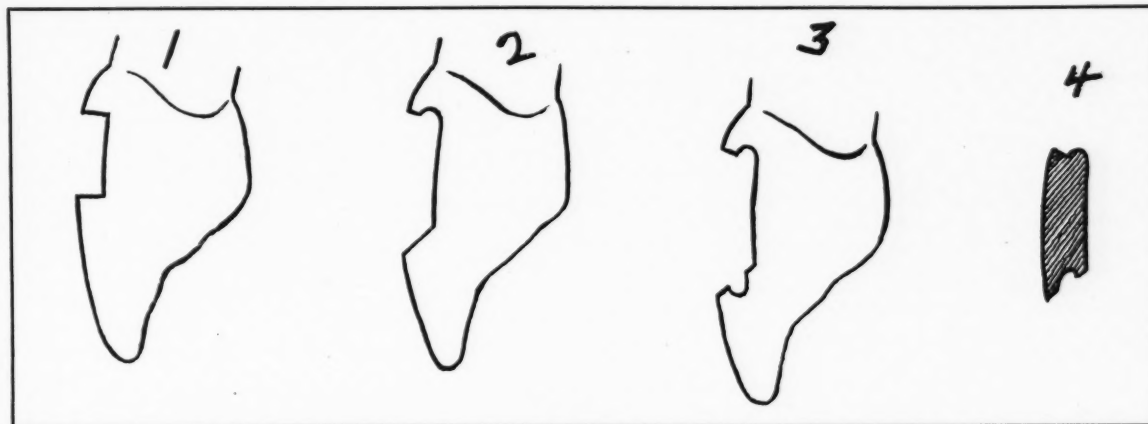


Fig. 1—Cavity preparation ordinarily advocated. Adequate retention cannot always be secured with this preparation.

Fig. 2—Modified preparation. Note that a countersink, or undercut, is made at the gingival. This is done with a round bur; the size used depends on the size of the tooth, and the depth to which this cut may be made. The incisal cut is sloped to the incisal. It will be noted that the impression may be removed by pulling it downward and outward. The finished inlay may be inserted in a reverse manner. The axial walls of the cavity are prepared at right angles to the tooth.

Fig. 3—After the impression of the cavity is secured, a lock is cut at the incisal similar to the one made at the gingival. This completes the retention of the preparation.

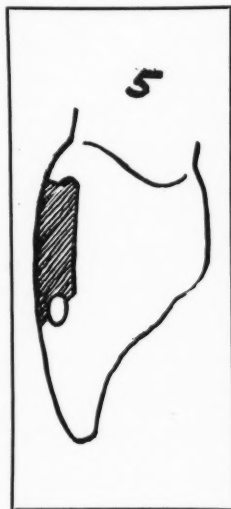
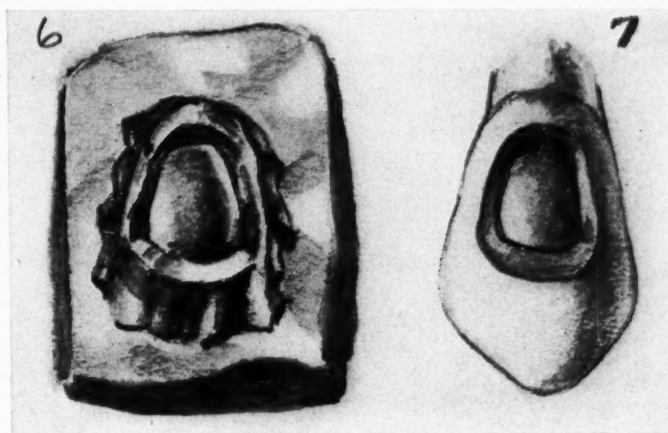


Fig. 5—Inlay in position in the cavity. Cement flows into the incisal void, locking it in the tooth.

Fig. 6—Two methods may be employed for baking of the inlay. This shows the platinum matrix invested in a high-fusing material. High-fusing porcelain is used in this method, and the case is finished without returning it to the die.

The other firing technique is to use a lower-fusing porcelain, returning it to the die for reburnishing after each bake. This method requires several bakes. The former method requires fewer firings.

Fig. 7—Labial view of the preparation.



Any excess porcelain is best removed by cementing the inlay into the die before the platinum matrix is removed. Cutting to the margins may then be done without the danger of chipping the margins of the inlay. The inlay may be given a high polish while it is still cemented to the die.

THE accompanying illustrations show suggestions for cavity preparation for class five cavities which may be used for porcelain as well as for gold inlays. It has satisfactorily solved a problem of retention in the most difficult cases.

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The technique was first used on a patient who presented extreme erosion, with gum recession, on the labial of the lower anterior teeth. The areas extended from the gingival third of the crown incisally to about the same

extent rootwise. The remainder of the crowns of these teeth were in perfect condition. A restoration with a porcelain inlay in this type case seems much more conservative than a jacket crown.



# A CAVITY LINING APPLICATOR

P. H. BELDING, D.D.S.

Waucoma, Iowa

A SIMPLE and effective means of handling cavity lining is presented which utilizes empty cylindrical-shaped anesthetic carpules.

## METHOD OF CONSTRUCTION

The carpule is thoroughly cleaned and grasped delicately by its extremities with suitable appliances, and inserted in a gas flame (Fig. 1). Here it is heated to the right degree of

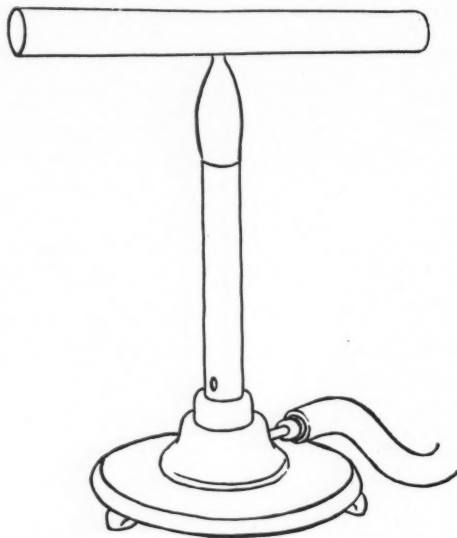


Fig. 1—Carpule inserted in gas flame.

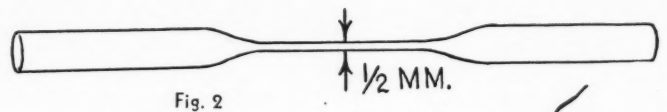


Fig. 2

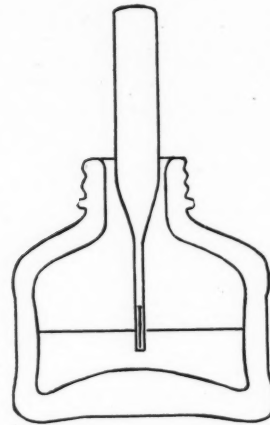


Fig. 3

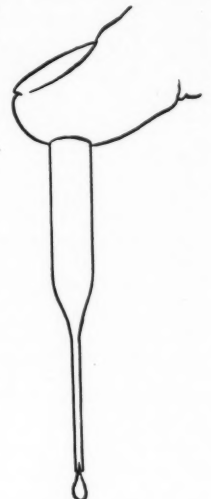


Fig. 4

Fig. 2—Two glass funnels.

Fig. 3—Small end of funnel inserted in liquid medium.

Fig. 4—Amount of flow being controlled by finger pressure.

ductility and drawn to the desired dimensions; then, it is cooled and broken. Two elongated glass funnels result (Fig. 2).

## UTILITY

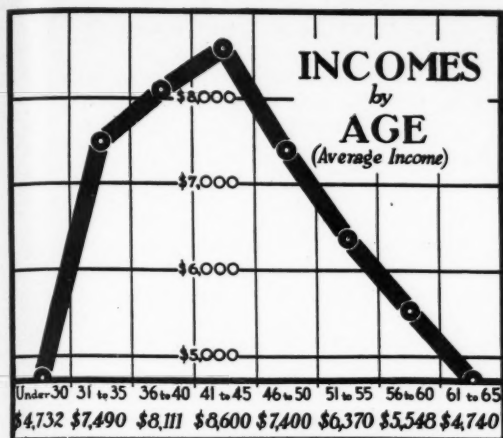
The small end of these funnels is inserted in the liquid mediums and

capillary attraction charges the instrument with a load sufficient for all practical purposes (Fig. 3). The small end of the instrument is conveyed to the desired position in the cavity, and finger compression on the large end of the funnel expresses the fluid. The amount of flow is

readily controlled by the amount of finger pressure (Fig. 4).

The operation is always accomplished with the greatest precision; in fact, it absolutely precludes the possibility of contaminated margins if ordinary precautions are used.

# TO KEEP ABREAST IS TO STAY AHEAD



## A Story of Books and Men

This chart shows the trend of the average dentist's income. From the ages of 26 to 42 his income mounts from \$4700 to \$8500—and then declines steadily until the age of 60 he is back at his starting point, again earning \$4700. This curve refers to the average. The incomes of many dentists exceed these figures. Thousands of men continue to increase their income long beyond the age of 45. They are the *exceptions*. They are the ones who have kept abreast.

Why this radical curve? Why does not the average dental practitioner maintain his peak earning power for a longer period? It cannot be attributed entirely to his health. Nor is it due to impairment of his operating skill.

One answer is to be found in the rapid progress of dental science. Too many dentists devote all of their time to their practice of *today*, with little thought of their practices of *tomorrow*. Depending too much upon their college training, plus their operating skill gained through experience, they become detached from new developments, new technics, new scientific thought.

The books that would bring them this newer knowledge, many of them think they have not the time to read. The public has a way of seeking the *new*, the *modern*. This applies to dentistry as well as to any other service or commodity. Thus dental practices migrate to the men who have kept abreast. In keeping abreast they have stayed ahead.

This isn't fable. It is hard rock economics. An investment in modern dental books today is an investment in a better practice tomorrow. A small investment each year will keep a dentist abreast with the modern developments and new thought in dentistry—will arm him with the knowledge which will keep him young, keep him moving forward.

The books on this page are essential in any modern dental library. Make these your first 1936 investments.

## ANESTHESIA IN DENTAL SURGERY

By Sterling V. Mead, D.D.S., M.S., B.S.

Washington, D. C.

Freedom from pain is demanded of present-day dentistry. In order to perform dental or surgical operations intelligently, keeping the patient free from pain, avoiding fatigue and shock, it is necessary to become familiar with the various anesthetic agents and their administration. The control of pain is the result of correct anesthesia. The reward is better operative results and patient confidence.

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The ability to recognize pathological disturbances and to diagnose and treat these conditions successfully is a fundamental necessity in modern dental practice. The dentist who makes a diagnosis so that he may correctly treat his patient is more than a workman in the oral cavity. He is a scientist. This book supplies the dentist with the fundamental principles and practical knowledge necessary for routine work in making a correct diagnosis of abnormalities within the mouth, thus permitting a correct prognosis so that proper treatment may be applied more promptly and more efficiently. Every phase of diagnosis and treatment of diseases of the soft tissues is gone into carefully. No step is left out.

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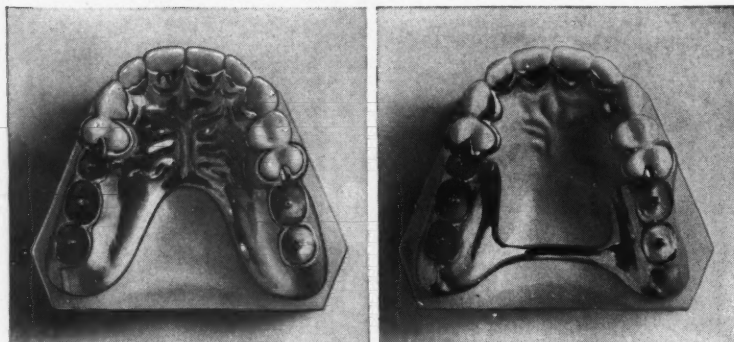
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## About Our Contributors

WINFIELD S. FISHER, D.D.S. (Northwestern University Dental School, 1919) published an article in the August, 1935, issue of this magazine, entitled **THE COST OF DENTAL CARIES: ITS SIGNIFICANCE IN PRESENT TRENDS IN DENTISTRY**. This article aroused much comment and it is anticipated that the present article which is of an entirely different character will prove equally stimulating.

CHARLES A. SWEET, D.D.S. (University of California College of Dentistry, 1919) wrote the leading article for May, 1935, for Child Health Month, on **CAVITY PREPARATION FOR DECIDUOUS TEETH**. Doctor Sweet's complete professional biography appeared in that issue.

ELI OLECH received his D.D.S. in 1923 and his M.S. (in oral surgery) in 1930, from the University of Illinois College of Dentistry. Doctor Olech is a member of the American Dental Association, the Illinois State and the Chicago Dental Societies. He has been teaching oral surgery at the University of Illinois for twelve years, and his practice is limited to oral surgery and exodontia.

DON E. WOODARD, (D.D.S., 1923, State University of Iowa, College of Dentistry; M.S.D., 1930, Northwestern University Dental School) reported a case of **NECROSIS FOLLOWING INFILTRATION** in the August, 1934, issue of this magazine at which time his complete professional biography was given. In August, 1935, Doctor Woodard again appeared in these pages with an article on **OSTEOMYELITIS OF THE JAW**.

LUCIEN Z. MCCLUNG, D.D.S. (Vanderbilt University, Nashville, Tennessee, 1923) wrote for **THE DENTAL DIGEST** in October, 1933, an article on **BAKED PORCELAIN RESTORATIONS IN COMBINATION WITH GOLD**. Doctor McClung's professional biography appeared in that issue.

PAUL HERBERT BELDING, D.D.S. (State University of Iowa, 1919) published an article on **SPECIFIC TREATMENT OF PERIODONTAL DISEASE** in the July, 1935, issue of this magazine. This article was written in collaboration with his brother L. J. Belding, M.D. and their professional biographies appeared at that time.



Incomparable in  
quality, effectiveness  
and safety for promot-  
ing the hygiene of the  
teeth and gums.

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*The Priceless Ingredient of Every Product is the Honor  
and Integrity of its Maker*



E. R. Squibb & Sons, Dental Department, 3201 Squibb Building,  
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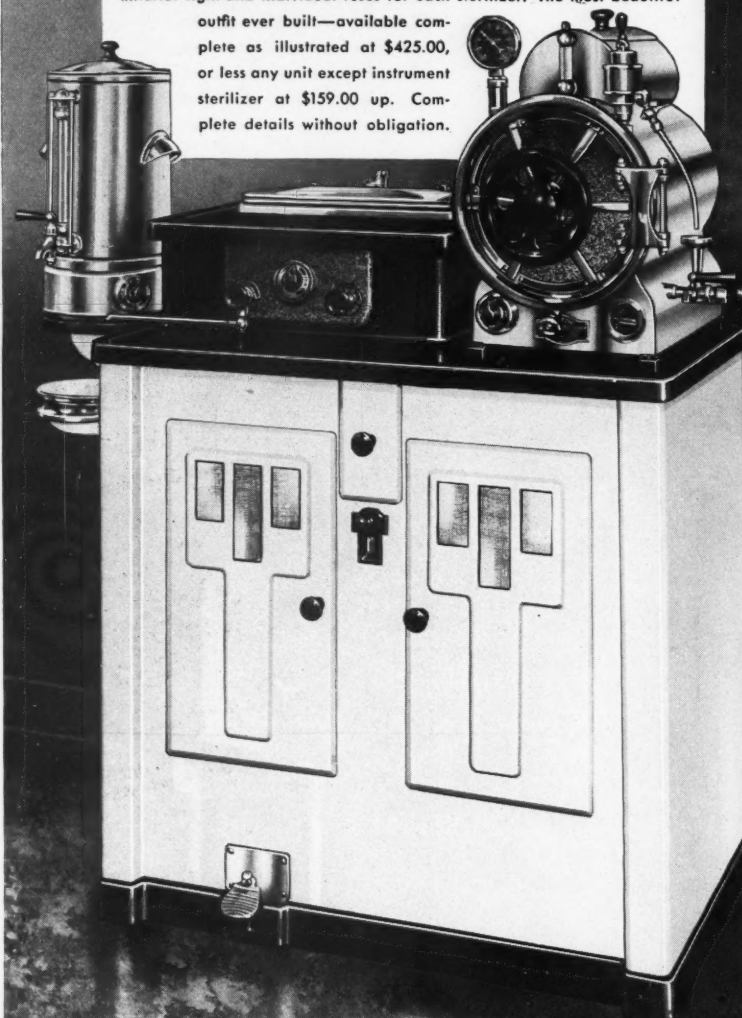
Attached hereto is my professional card or  
letterhead. Please send me a complimentary  
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"The sterilizer that has everything"—including 8" x 16" autoclave, recessed instrument sterilizer, 2-gal. water sterilizer, removable 8" syringe sterilizer, combined master switch and pilot light, automatic interior light and individual fuses for each sterilizer. The most beautiful outfit ever built—available complete as illustrated at \$425.00, or less any unit except instrument sterilizer at \$159.00 up. Complete details without obligation.



**THE PELTON & CRANE CO., DETROIT, MICHIGAN**

### WOULD YOU LIKE TO ATTEND THE INTERNATIONAL DENTAL CONGRESS? VIENNA, AUSTRIA, AUG. 3-9, 1936

Join our group of dentists and families going to this meeting if you want a comprehensive trip at a reasonable cost. We sail in July using ships of the CUNARD-WHITE STAR LINE and return to New York, Aug. 29th. We visit France, Austria, Germany, Holland, Belgium, and England. Every detail is arranged with special reference to economy and comfort and may be paid for by a special deferred payment plan, if you wish. Write at once if interested.

Return the coupon on page 34 for complete information.

**C. W. CARRICK, D.D.S., OBERLIN, OHIO**

**If you are not a subscriber to THE DENTAL DIGEST,  
you will find a postcard in this issue. Sign and return  
it at once. The subscription rate is only \$2.00.**

## THE PUBLISHER'S NOTEBOOK

**T**HIS month the new DENTAL DIGEST enters its fifth year. In the four years since the old DIGEST was acquired and completely changed, despite the necessity of doubling the old subscription rate, and despite the depression, the paid circulation has been doubled. Now advertising has begun to show a substantial increase; this number carries nearly double that which has appeared in recent numbers. I make no apology for referring in the NOTEBOOK to the magazine's advertising volume. Readers know that, without advertising, modern periodicals could not be sold to subscribers at the low rates prevailing.

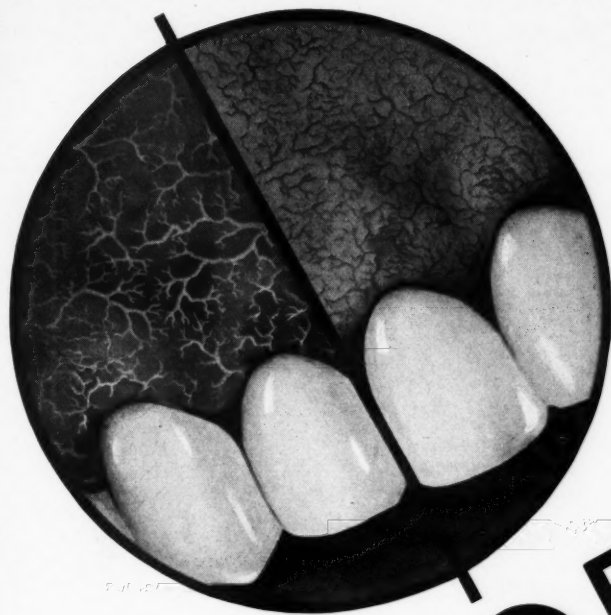
This journal costs the subscriber less than seventeen cents a copy, out of which must be paid the cost of securing the subscription, billing, postage, envelope, addressing, etc.; the publishers receive, net, less than six cents a copy. It is obvious that a magazine of this character cannot be edited, illustrated, and printed for anywhere near six cents a copy.

In modern publishing practice the advertiser pays most of the cost of publication. The elaborate magazines you receive today would be impossible without advertising; subscription rates would be so high that only a few could afford them; the total in most cases would not provide sufficient revenue, even at very high rates, to pay for publication costs.

\* \* \*

This yearly milestone recalls to mind the first issue published by us, back in January, 1932. The original dummy is still tucked away in my desk. When we were starting, we had not perfected methods for making up the magazine for the printers. Never before had we faced the task of planning the make-up of a journal carrying numerous technical illustrations.

The first article in that old first issue was *The Technique and Results of Surgical Pyorrhea Treatment*, by Doctors Crane and Kaplan of Washington. The authors had provided eighty-two illustrations. Some were to be reproduced full size; others were to be reduced; others were to be grouped in exact relation to each other, so that the technique might readily be followed. Because there was, at the time, no one else in the publication office to tackle the job, I had to do it myself, and I well remember the long hours I put in ar-



# COLLAPSED CAPILLARIES.

*Short ration teeth*

Ipana gum massage, by improving circulation in collapsed capillaries which have interrupted adequate teeth nutrition, aids in keeping teeth strong. Restoration of sagging, flabby gingivae to vigorous health affords teeth solid setting.

Brushing with Ipana gives teeth their natural whiteness and brilliance. For gentle, effective maintenance of teeth and gums, suggest Ipana to your patients.

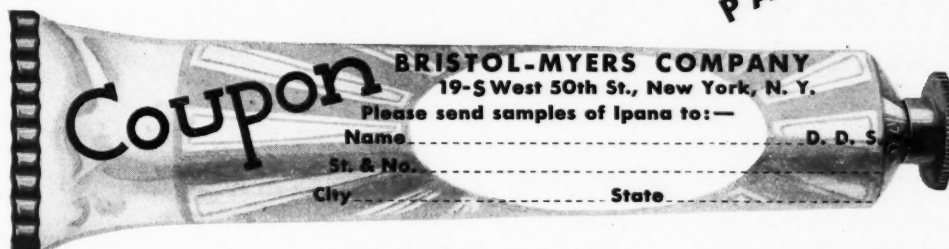
Clinical sizes of Ipana are yours for the request. And why not let your family try it?



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A condition of gum flabbiness, warning of serious oral disorders if neglected. Ipana massage aids your patient to overcome "pink tooth brush".

## IPANA TOOTH PASTE



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# THE BALANCED CEMENT

**T**HE only way by which the dentist can exercise complete control over his cementations is to select a dental cement that embodies all the elements necessary to a perfect clinical result.

Universally is it true today as through almost 50 years, that the most exacting members of the profession choose Ames Cement because it presents in perfect balance all the qualifications of a cement that will realize the skill and science of the operator.

THE W. V-B. AMES COMPANY  
Fremont, Ohio

## AMES DENTAL CEMENTS

Read Less - - Know More - - Subscribe  
to THE DENTAL DIGEST

HERE IS YOUNG'S  
NEW, CONVENIENT  
VISIBLE PACKAGE



A fine carton containing one-half gross of *improved* BS Polishers . . . two sample Baby BS Polishers and a sample mandrel. They are available thru your dealer at only \$3.50.

ES Polishers have won widespread approval for *rapidity of operation, thoroughness in cleansing, complete gentleness and safety, and low price*. Now, two additional features are offered: (1) the *anchorage* principle of construction. See cross-section view showing rubber extending thru screw; it can't pull loose. (2) the new, wide flair fully covers the outside of the bearing in the h. p. Note the *skirt* construction; the thin edge fitting tightly over the concave nut on the h. p. This improvement is so compact that no additional space is required—and it cannot contact the tissues.

BS Polishers are also available in regular packages of a dozen at 60c.

YOUNG DENTAL MANUFACTURING CO., 4958 SUBURBAN R. W., ST. LOUIS, MO.

You can save money without over-stocking by purchasing the Ames Duplex package. Four units only, but at a very appreciable saving.



ranging and rearranging the eighty-two pictures, figuring sizes for reproduction, checking sequence, trying to keep the captions in order, trying not to place roentgenograms upside down, trying not to label Fig. 15 as Fig. 26.

The article opened with a full page showing instruments, nineteen of them. The authors had furnished nineteen separate pencil drawings on very heavy cardboard and the attempt to paste these in their proper arrangement failed completely.

Finally the engraver came to the rescue, arranging to photograph a reduction of each of the nineteen drawings separately and group the nineteen negatives for transfer to the copper plate which would then be etched for the actual printing as a single page.

There were numerous other problems of this character in putting together that first new DIGEST. Now this sort of thing is just part of the day's work for Robert Ketterer, the journal's publication manager. He is the human link between the editor and the reader, directing the transformation into print of the manuscripts and pictures he receives from Doctor Ryan's office each month and seeing to it that the magazine reaches readers promptly. In the early days, when we were learning by painful experience, it seemed impossible to get THE DIGEST into the mails on time. Now the mailing schedule, the fifteenth of the month of issue, is maintained and delay only rarely occurs.

Another thing we had to learn was how to care for the multitude of details incident to handling thousands of paid subscriptions. For years we had been publishing *Oral Hygiene*, but as that journal is sent to every practicing dentist without charge we had never had occasion to learn anything about the bookkeeping, billing, and mailing-list methods necessary in keeping paid subscriptions straight. Nor did we foresee the enormous amount of correspondence involved.

Because the magazine was almost invariably very late in reaching subscribers and because we were, in our ignorance, using round-the-barn methods for handling subscription details, we received even more letters from subscribers than the large number which paid subscription publishers customarily are obliged to answer. Even now, under a perfected system, there are plenty of letters to answer; some are our fault; some are not.

For example, at almost regular intervals we receive a letter from someone complaining that we are billing



Cross  
Section  
View  
of BS  
Polisher



## FAITHFUL REPRODUCTION ASSURED

When the dentist has painstakingly taken an accurate impression for his model, formed the wax pattern, skillfully positioning the teeth and modeling the gum formation, his great concern is to obtain faithful reproduction in the finished denture. The setting of the teeth must not be disturbed and dimensions must be rigidly adhered to or the fit and bite will be impaired. With Luxene resinoid he can be confident that the denture will be an accurate replica of his wax pattern.

The reasons Luxene resinoid reproduces the pattern so accurately are easily explained. It is a thermo-setting

substance. When subjected to moderate heat it becomes semi-fluid and, under light pressure, flows into every crevice in the mold. Under uniform heat in the vulcanizer it assumes its first and its final form. It comes from the mold a permanent reproduction of the wax pattern. As little pressure is required to press the fluid mass around the teeth, excellent structural adherence is obtained with small possibility of disturbing tooth position.

Thousands of dentists are establishing reputations for exceptionally fine denture work through using Luxene resinoid. Since 1932 they have made

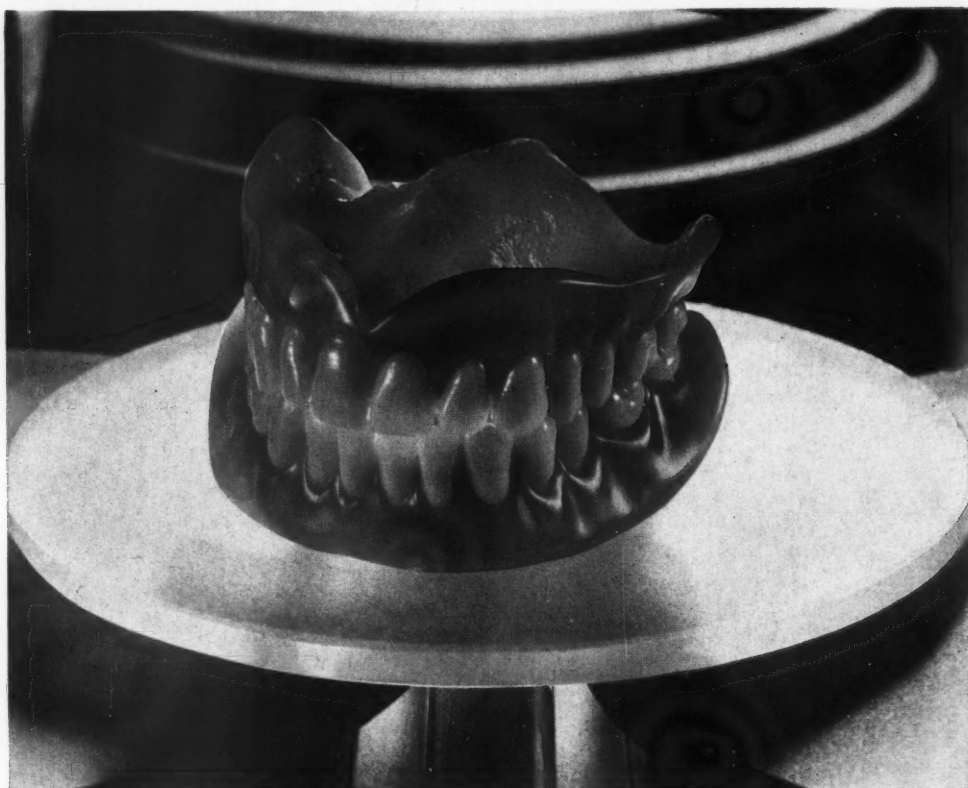
hundreds of thousands of these dentures.

On the back of this insert is a brief summary of Luxene resinoid properties and advantages, and a booklet P telling The Story of Luxene will be mailed on request.

BAKELITE DENTAL PRODUCTS, Inc.  
SUBSIDIARY BAKELITE CORPORATION  
 247 Park Avenue, New York, N. Y.

# LUXENE

REG. U. S. PAT. OFF.



## ORIGIN AND DEVELOPMENT OF LUXENE RESINOID

The discovery of phenol-formaldehyde resinoid by Dr. L. H. Baekeland twenty-eight years ago, opened up many avenues for creative laboratory research. This new resinoid, which was named Bakelite, became the base for several thousand new materials. It soon was evident that Bakelite resinoid possessed many properties long

sought for in a denture material, but it required some twenty years of intensive laboratory research and continuous experiment to produce a denture material which was superior in all essentials.

This objective was attained in 1932, and the new resinoid material was called LUXENE.

### Properties and Advantages of Luxene Resinoid

1. *Natural Color.* Its translucent pink is durable and closely simulates color and appearance of healthy gums.
2. *Strength.* It is tough, strong and resilient. A check of 35 thousand dentures showed only 1.7% breakage from all causes.
3. *Permanency of Form.* Once it is molded, cured and set the denture does not change its shape.
4. *Tissue Tolerance.* Authorities report that oral tissues are healthier under Luxene Resinoid Dentures.
5. *Absence of Absorption.* It is a permanently dense, homogeneous substance. No moisture can penetrate its lustrous surface.
6. *Odor and Taste.* It is odorless and tasteless. Non-absorbent, it cannot acquire either odor or taste.
7. *Permanent Adherence.* In the mold, it first becomes fluid, surrounds teeth and metal parts, and solidifies into an integral part of denture.
8. *Curing Time.* It cures in 2½ hours at 266° F. in an ordinary vulcanizer.

9. *Expansion and Contraction.* Mouth temperatures will not expand or contract the denture. There is no absorption so it neither swells nor shrinks.

10. *Length of Life.* Its strength and texture do not deteriorate. Original denture dimensions are permanent. Color is durable. It will last indefinitely.

11. *Cleanliness.* It is unaffected by oral secretions, acids, alkalies or alcohol. Soap and water brushing keeps denture hygienic.

12. *Ease of Repair.* Luxene Resinoid Repair is a special form which cures in less time and at lower temperature. Dentures may be rebased or repaired so perfectly that only the closest inspection can detect it.

BAKELITE DENTAL PRODUCTS, Inc.

SUBSIDIARY BAKELITE CORPORATION

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# LUXENE

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# NOVOCAIN <sup>with</sup> COBEFRAIN

## AS UNIFORM AS TIME ITSELF

**A**S UNIFORM as time itself... in anesthetic efficiency... in safety to your patient... in enabling you to gain the confidence of your patient in you and your work. This quality should be the essential consideration in your choice of a local anesthetic... a consideration that is a watchword in the manufacture of every cartridge of Novocain with Cobefrin.

When you inject a Cook or R. B. Waite cartridge of Novocain with Cobefrin you may expect uniformity in anesthetic efficiency with a minimum of by-effects—particularly in those cases in whom you have been forced in the past to take unusual precautions against shock and syncope.

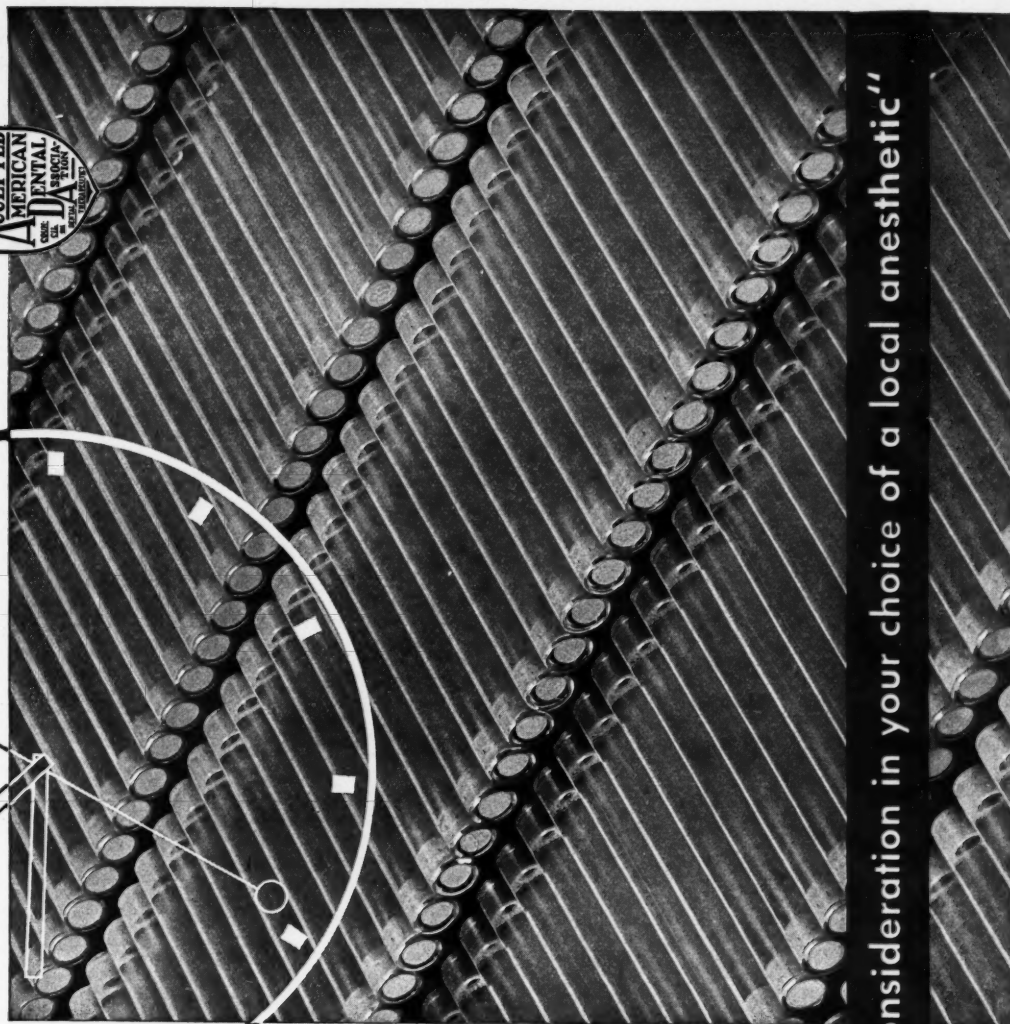
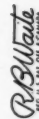
If you are not already using Novocain with Cobefrin in either Cook or R. B. Waite cartridges, try a box today. Accepted by the Council on Dental Therapeutics of the American Dental Association.

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**The ANTIDOLOR MFG. COMPANY, Inc.**

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Laboratories: Ronselaer and Springville, N. Y.



**"Uniformity... an essential consideration in your choice of a local anesthetic"**

Novocain, Reg. U. S. Pat. Off., Winthrop Chemical Company, Inc., Brand of Procaine HCl.  
Cobefrin, Reg. U. S. Pat. Off., Winthrop Chemical Company, Inc., Brand of Nordefrin.

*Your patients may not ask you ...*



*but they need this type of Advice*

PRACTICALLY every patient who comes into your office is in need of your advice on what to eat.

For example—the patient who has had several teeth extracted or because of dental disease, instrumentation or restorations has sore gums, for some time will find it difficult to chew solid food.

Then there is the undernourished child, with poorly calcified teeth, or the pregnant woman who still believes the old adage “for every child a tooth.” Ovaltine adds materially to the calcium and phosphorus content of the diet as well as supplying an adequate amount of the antirachitic Vitamin D.

In many of these cases Ovaltine will help solve the diet problem and avoid the difficulty of obtaining proper nourishment, which is almost invariably an aftermath of dental operation.

Ovaltine is a food-concentrate, palatable, easily digested. It has all the food value of cow's milk, together with additional essential nutritive principles.

### **The Coupon Brings You Professional Samples**

*Send it in together with your professional letterhead, card or other indication of your professional standing, and some samples of Ovaltine will be sent you.*

**This offer is limited only to practicing dentists,  
physicians, nurses and dietitians**

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Please send me, without charge, some samples of Ovaltine or distribution to my patients. Evidence of my professional standing is enclosed.

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# OVALTINE

*The Swiss Food-Drink*

*Manufactured under license in U.S.A.  
according to original Swiss formula.*

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### Write for this New Attachment Size Guide

Size Chart		
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C M	322	
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C M	324	
C M	325	
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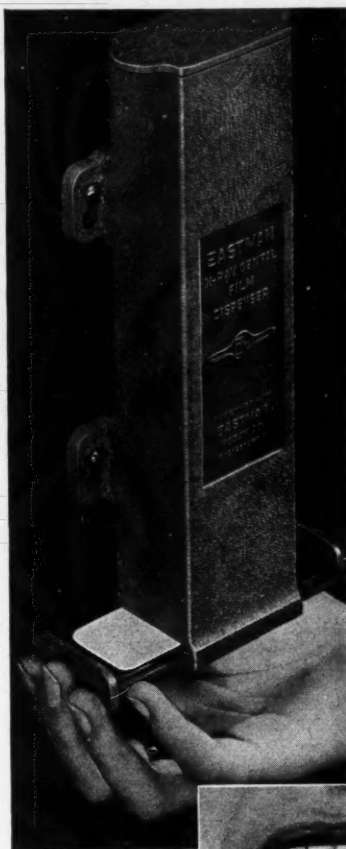
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him for a subscription already paid, when, as a matter of fact, he has paid his *Literary Digest*, not his *DENTAL DIGEST* subscription. In such cases readers often send us the cancelled checks which have come back from the *Literary Digest's* bank, not ours, as proof that our bookkeeping has skidded! But sometimes, despite our perfected system, our subscription bookkeeping does skid, so I suppose we shouldn't complain when we are occasionally wrongfully accused.

\* \* \*

This month *Oral Hygiene* is celebrating its Silver Anniversary, marking its first quarter-century by publishing an issue devoted, not to the history of *Oral Hygiene*, but to dentistry's progress during the last twenty-five years. Beyond a reference in my own Corner to the magazine, there is nothing in the issue about *Oral Hygiene*. My idea was to devote the Silver Anniversary Number largely to a history of the journal, but Doctor Ryan thought this might make tiresome reading and I guess he was right about that; anyway, the story had been told twice before, in the fifteenth and the twentieth anniversary issues.

So in this month's *Oral Hygiene*



**Out of the  
Dispenser**

**...Into the  
Mouth**



**...Into the  
Receptacle**



## The Best Films...the Best Way To Use Them

NOT just any film in a proper-size packet is adequate for dental radiography... Exact requirements must be met.

For this reason Eastman provides in Radiatized Film every special quality necessary for best possible results. Emulsion is coated on both sides of a safety (cellulose acetate) base to reduce exposure time, yet assure maximum detail and high contrast. A protective coating guards the emulsions against abrasions and crimp marks. Packets are white, machine-made, sanitary, comfortable.

### Efficient Accessories

To use Radiatized Films efficiently, load the Eastman Dental X-ray Film Dispenser with the economical dispenser package... A press of the plunger delivers one clean, protected packet to the finger-tips. After exposure, drop the packet into the Eastman Receptacle, and the film is safeguarded until it is processed.

For greatest economy, standardize on these finest films... use them this most efficient way.

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(Or use coupon on page 35)



## You can measure patients' pain in terms of money



Thousands of dollars have been spent in recent years in modernizing dentists' offices; installing modernly designed, colorful equipment, doing everything possible to provide a pleasing, attractive atmosphere that would be inviting to patients.

But the most attractive office cannot overcome a fundamental human characteristic—*resistance to pain*. The patient who fears the irritating, grinding sensation of the bur is not likely to welcome a visit to the dentist. Patients who can well afford dental attention are putting it off because they visualize every dental operation as an ordeal.

There is a pleasant, economical and safe way to overcome this fear of pain—analgesia with a McKesson Nargraf or Euthesor. McKesson analgesia permits the patient to be perfectly at ease, eliminating the nervous tension which is so disturbing to both patient and operator.

Complete office modernization takes into account the economic aspect of pain. Get the facts on McKesson apparatus. You will be surprised how simply and safely these machines operate. You will also be agreeably surprised at the small investment involved.

Gas analgesia the positive way to a happier dental practice.

McKesson equipment the positive, economical way to gas analgesia.

Return the coupon on page 35

**McKESSON APPLIANCE CO.**  
TOLEDO, OHIO

Doctor Frederick B. Noyes epitomizes the last quarter-century of dental education; Doctor Walter H. Jacobs in a highly entertaining article deals with the last twenty-five years of dental practice; Doctor Weston A. Price looks back at dental research; and Doctors Harvey J. Burkhart and John Oppie McCall tell about dental philanthropy, while a staff writer covers the progress of dental legislation since 1911.

Incidentally, next month *Oral Hygiene* starts a new serial by Doctor R. Raper, whose *Thirty Reasons Why People Stay Away from Dentists* was so popular. His new contribution is *Radiodontic Puzzle Pictures*, an informal presentation of the subject of interpretation. The opening chapter, in February, will be *The Mystery of the Missing Tooth Body*. It presents a case from the practice of Doctor Albert H. Ketcham of Denver, illustrated with roentgenograms. In March, after readers have had thirty days to try to solve the mystery, Doctor Raper will reveal the solution and will present the next case. This procedure will be continued throughout 1936.

MERWIN B. MASSOL, Publisher

## the PUMICE does the Work!



There is no substitute for fine Pumice as a prophylaxis material. It has every characteristic necessary for this work and when used in the form of Buffalo Prophylaxis Paste, it not only does a splendid cleaning job, but it leaves a pleasant remembrance in the mouth of the patient.

A generous quantity in a handsome opal glass jar for \$1.00 at your dental dealer.

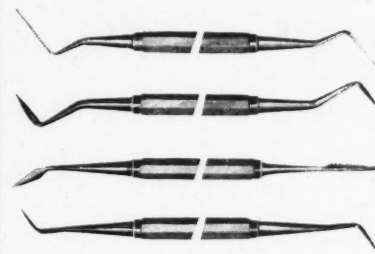
**Buffalo Dental Mfg. Co.**  
Kehr and Urban Sts. Buffalo, N. Y.

## Pyorrhea Surgery for the General Practitioner

### THE GINGIVECTORS

A Selection Of Four Double End Instruments To Carry Out A Technique Of Gingivectomy In The Treatment Of The Surgical Eradication Of Pyorrhea.

by Dr. Albert E. Sanders,  
of Los Angeles.



This set of instruments will reach and remove all portions of gum neatly and cleanly. They are suited to do a single tooth operation, as well as an operation of the entire mouth. The book of technique as edited by the designer will be furnished with the instruments. The triangular oil stone will fit into the blades of the saw curettes so as to re-sharpen these blades accurately. The flat surface is used for sharpening knives. Price per set, Immunity Steel, with stone—\$13.00.

Sold on thirty day trial

THE HU-FRIEDY MFG. COMPANY  
3118 N. Rockwell St., Chicago, Ill.

Send one set of Sanders Surgical Pyorrhea Instruments for 30 days trial.

Dr. ....

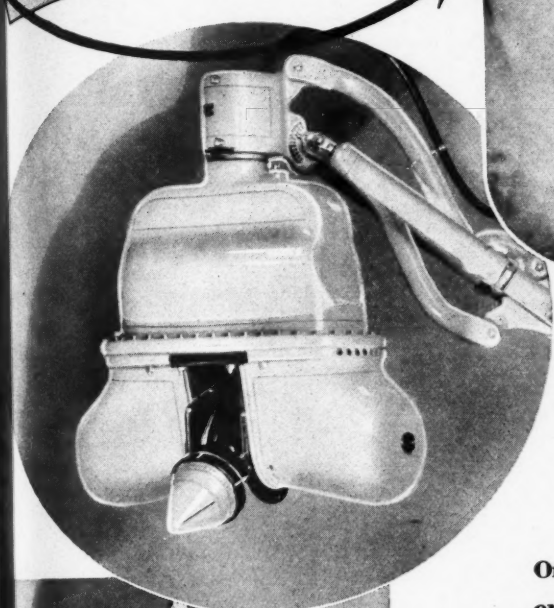
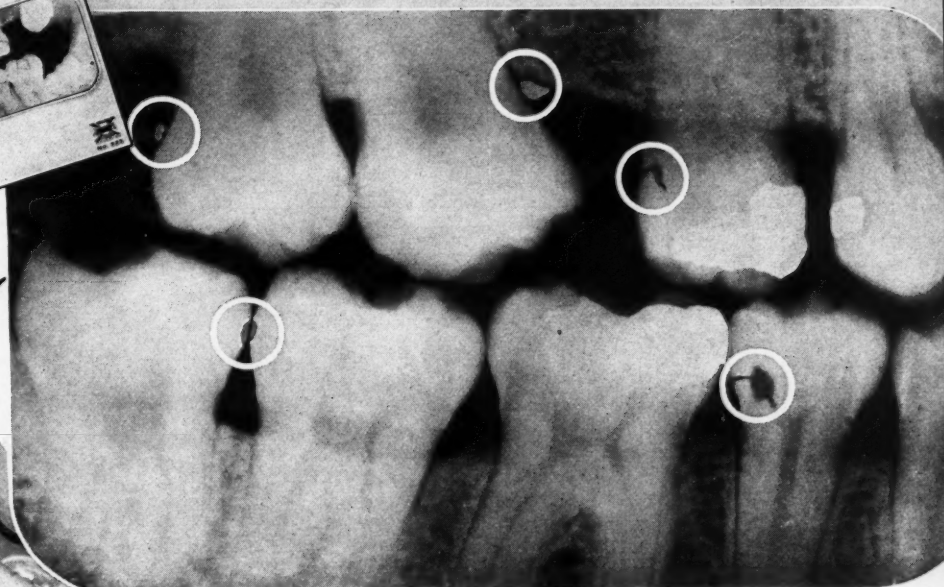
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## INTERPRET THIS CASE ACCORDING TO YOUR FEES!

Only with X-ray can you discover all the work there is to be done. *And only with a Ritter Model "B" Shockproof X-Ray Unit can you be sure of uniformly perfect results—clear, undistorted radiographs that permit a complete, accurate diagnosis.*

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Let the Ritter Model "B" disclose deep lying unsuspected conditions in your patients' mouths—reveal unexpected, *extra* fees and income. (The Ritter Model "B" Shockproof X-Ray Unit may be purchased on the Ritter Deferred Payment Plan or the F.H.A. Plan, requiring no down payment. See your Ritter Dealer.)

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BUILD YOUR PRACTICE WITH  
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Ritter Model "B" Shockproof X-Ray Unit combines



See second cover

D.D.1

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WERNET DENTAL MFG. CO.  
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Send free supply of Dr. Wernet's  
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I want to know more about Weber  
Equipment. I am interested particularly  
in ☐ a unit ☐ a chair ☐ a cabinet  
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Send me the books checked with "X,"  
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Dental Surgery" \$6.50; ☐ Mead "Di-  
seases of the Mouth," \$10; ☐ Mead "Oral  
Surgery," \$12.50.

Dr. \_\_\_\_\_

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See page 25

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or letterhead. Please send me a compli-  
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See page 26

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THE PELTON & CRANE COMPANY  
DETROIT, MICHIGAN

Send complete details concerning your  
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Dr. \_\_\_\_\_

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See page 27

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Please send samples of Ipana to:

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See page 26

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C. W. CARRICK, D.D.S., OBERLIN, OHIO

Send complete information concerning  
European Tour.

Dr. \_\_\_\_\_

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POWERED

*The Perfect Adhesive for Dentures*

« Immediately after a patient is  
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the use of CO-RE-GA is indi-  
cated; to help create confidence  
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(Illustration of a smile)

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PLEASE SEND FREE SAMPLES FOR PATIENTS

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CLEVELAND OHIO, U.S.A.  
*This Coupon is for Dentists use only*



See page 31

D.D.1

COLUMBIA DENTAL & X-RAY CORP.  
131 EAST 23RD STREET, NEW YORK CITY

Please send catalogue mentioned in ad.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

See page 36

D.D.1

HOFFMANN-LA ROCHE, INC.  
NUTLEY, N. J.

Kindly send samples of Larodon as mentioned in ad.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

See page 32

D.D.1

McKesson APPLIANCE COMPANY  
TOLEDO, OHIO

I would like to know more about nitrous oxide-oxygen analgesia and McKesson apparatus. ☐ Send me literature.  
☐ Have a representative call.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

See page 32

D.D.1

THE HU-FRIEDY MFG. COMPANY  
3118 N. ROCKWELL ST., CHICAGO, ILL.

Send one set of Sander's Surgical Pyorrhea Instruments for 30 days trial.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

See page 31

D.D.1

EASTMAN KODAK CO., ROCHESTER, N. Y.

Please send me "Dental Radiography and Photography" regularly.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

See page 30

D.D.1

THE WANDER CO.  
180 N. MICHIGAN AVE., CHICAGO, ILL.

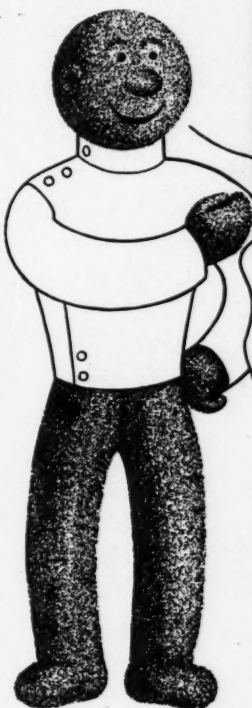
Please send me, without charge, samples of Ovaltine for distribution to my patients. Evidence of my professional standing is enclosed.

Dr. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

# EVERY BATCH OF MINIMAX IS THOROUGHLY TESTED!



These testers are  
certainly tough!  
If MINIMAX passes here  
"OK", you needn't worry  
about it in the mouth!

Tough tests is putting it mildly—but we want to be sure first. Then we know you can have greater assurance of successful fillings when you use Minimax Alloy No. 178.

Minimax is not a finicky alloy. Its process of manufacture scientifically provides for all physical requirements when manipulated by your individual method. It meets all Federal and A.D.A. specifications. It supplies all the working and serving qualities you have wished for in your filling material.

When you buy Minimax Alloy No. 178 you purchase also contentment and the confidence that comes with the knowledge of certain results.

The MINIMAX COMPANY  
Medical & Dental Arts Bldg., Chicago, Ill.

# Minimax

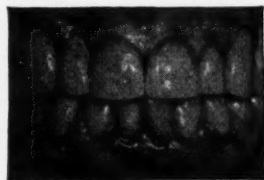
You Get More

Fillings suitable for alloy-mercury gauges.  
Complies with Revised (1934) A. D. A. Specifications No. 1.

—You Pay Less

1 oz. bottle..... \$1.80  
5 oz. bottle... \$1.70 per oz.  
10 ozs..... \$1.60 per oz.  
20 ozs..... \$1.55 per oz.

## CONSULT FRED KIDA ON YOUR NEXT DIFFICULT PROBLEM



Kida's original coping bridges are strong and esthetically beautiful.

Individual teeth are easily replaced.

Saddles can be made either with porcelain or gold.

These restorations have proven to be far superior to any other type.

MASTER WORKER IN PORCELAIN

FRED KIDA PORCELAIN LAB., INC.  
625 Madison Ave., N. Y. C. Tel. PLaza 3-1286-7-8

*For*  
**DENTAL  
PAIN**



## **LARODON**

phenyl-dimethyl-isopropyl-pyrazolon

### ***An entirely new analgesic by Roche***

Larodon is the outcome of chemical, pharmacological, and clinical research undertaken and perfected by Roche scientists in answer to the many requests from dentists for a new analgesic, an analgesic that can be depended on for quicker action without sacrifice of safety.

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#### **TOOTHACHE • NEURALGIA • POST-EXTRACTION PAIN PAIN FOLLOWING DENTAL WORK**

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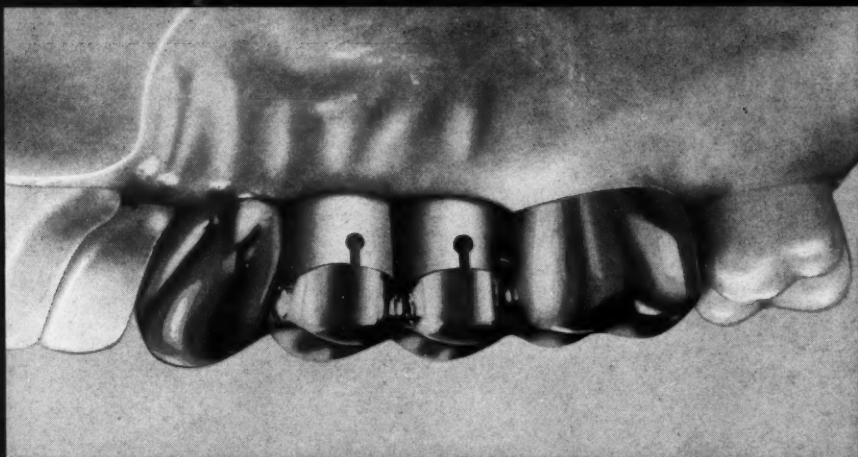
Prescribe Larodon—one or two tablets—for relief in any of these conditions. The results will be both gratifying and surprising. Usually only a few minutes will elapse and then the mask of pain will be lifted from the patient's countenance.

Samples to Dentists on Request

**HOFFMANN-LA ROCHE, INC., NUTLEY, N. J.**

(Use coupon on page 35)

# *THE SANITARY RESTORATION*



## STEELE'S TRUPONTIC

The ONLY INTERCHANGEABLE TOOTH providing clean porcelain tissue contact available to the profession today.

This feature gives the patient all the advantages of complete gingival restoration which automatically eliminates lingual gingival cavities common to ordinary facing bridgework.

This results in more sanitary bridgework without the loss of the advantages of true interchangeability...

THE COLUMBUS DENTAL MFG. CO. Columbus, Ohio, U.S.A.





*Beauty*

is just Harmony of line  
Proportion and Color.

When teeth harmonize in  
Form and Color with face form  
and Complexion, you have the  
nearest approach to *Beauty*

possible for that individual.

NEW TRUBYTE TEETH

enable you to obtain Harmony

the first requisite for Beauty.



THE DENTISTS' SUPPLY COMPANY OF NEW YORK